Supreme Court, U. S.
FILED
MAR 14 1980
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM 1979

No. 79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511
Counsel for American Textile Manufacturers Institute, Inc.

GREGORY B. TOBIN
OGLETREE, DEAKINS, SMOAK, STEWART & EDWARDS
3920 First National Bank Tower
Atlanta, Georgia 30303
Counsel for American Textile Manufacturers Institute, Inc.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, Virginia 23219
Counsel for American Textile Manufacturers Institute, Inc.
and for
Fieldcrest Mills, Inc.

(Counsel list continued on inside cover)

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Milliken and Company

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
Counsel for Arkwright Mills

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S. C. 29304
Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Blair Mills, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Hermitage, Inc.

ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541
Counsel for Dan River, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
Baker & Hostetler
1776 K Street, N.W.
Suite 900
Washington, D. C. 20006
Counsel for Cone Mills Corporation

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
1201 Maple Street
Greensboro, N. C. 27405
Counsel for Cone Mills Corporation

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
Counsel for Mayfair Mills

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S. C. 29715
Counsel for Springs Mills, Inc.

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
Constangy, Brooks & Smith
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303
Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, Georgia 31833
Counsel for West Point-Pepperell, Inc.

INDEX

Page

TABLE OF AUTHORITIES ii

OPINIONS BELOW 2

JURISDICTION 2

QUESTIONS PRESENTED 2

STATUTES AND REGULATIONS INVOLVED 3

STATEMENT OF THE CASE 4

A. The Statutory Framework 4

B. The Cotton Dust Standard 5

C. The Economic Evidence And The Decision That The Standard Is Economically Feasible 7

D. The Standard Of Review Applied By The Court Of Appeals To Sustain Economic Feasibility And The Four Year Compliance Period 10

REASONS FOR GRANTING THIS PETITION 13

1. There Is A Conflict Among The Circuits As To The Showing OSHA Must Make To Establish That Its Standards Are Economically Feasible 14

2. There Is A Conflict Between The Circuits As To Whether OSHA Must Demonstrate The Existence Of A Reasonable Relation Between The Costs Of A Standard And The Benefits Expected From It And As To Whether OSHA Must Demonstrate A Reasonable Necessity For The Standard .. 20

3. This Case Presents The Important Question Of The Proper Role Of The Reviewing Court Under The Substantial Evidence Standard Of Review 21

4. The Wage Guarantee Provision Exceeds OSHA's Statutory Authority 25

CONCLUSION 30

TABLE OF AUTHORITIES

Cases

Page

AFL-CIO v. *Brennan*, 530 F.2d 109, (3d Cir. 1975) 14, 16
AFL-CIO v. *Marshall* No. 78-1562, D.D.C. ..... Passim
A.L.A. Schechter Poultry Corp. v. *United States*, 295 U.S. 495 (1935) 19
American Petroleum Institute v. *OSHA*, 581 F.2d 493 (5th Cir. 1978) cert. granted *sub nom, Marshall v. American Petroleum Institute*, 440 U.S. 906 (1979) 14, 15, 20
American Iron & Steel Institute v. *OSHA*, 577 F.2d 825 (3d Cir. 1978), petitions for cert. pending, Nos. 78-918, 78-919 . 16, 21
Associated Industries v. *Dept. of Labor*, 487 F.2d 342 (2d Cir. 1973) 21
Crowell v. *Benson*, 285 U.S. 22 (1932) 24
Ethyl Corp. v. *EPA*, 541 F.2d 1 (D.C. Cir. 1976) 21, 22, 23
Florida Peach Growers Assn. v. *Dept. of Labor*, 489 F.2d 120, (5th Cir. 1974) 15, 20
Greater Boston Television Corp. v. FCC, 143 U.S. App. D.C. 383, 444 F.2d 841 (1970) 21
Industrial Union Dept. v. *Hodgson*, 162 U.S. App. D.C. 331, 499 F.2d 467 (1974) 12, 14
International Harvester v. *Ruckelshaus*, 155 U.S. App. D.C. 411, 478 F.2d 615 (1973) 12, 21, 22
National Cable Television Assn. v. *United States*, 415 U.S. 336 (1974) 18
National Labor Relations Bd. v. *Baptist Hospital, Inc.*, 99 S.Ct. 2598 (1979) 11
Panama Refining Co. v. *Ryan*, 293 U.S. 388 (1935) 19
Portland Cement Assoc. v. *Ruckelshaus*, 158 U.S. App. D.C. 308, 486 F.2d 375 (1973) 21
RMI Co. v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979) 14, 16
SEC v. *Chenery Corp.*, 332 U.S. 194 (1947) 9
Turner Co. v. *Secretary of Labor*, 561 F.2d 82 (7th Cir. 1977) 14, 16

Page

Universal Camera Corp. v. *N.L.R.B.*, 340 U.S. 474 (1951) 21
Whirlpool Corp. v. *Marshall*, 48 U.S.L.W. 4189 (February 26, 1980) 27, 28
Yakus v. *United States*, 321 U.S. 414 (1944) 24

Statutory Provisions

28 U.S.C. § 1254(1) 2
28 U.S.C. § 2112(a) 7, 19
Occupational Safety and Health Act, 29 U.S.C. §§ 651 *et seq*
29 U.S.C. § 652(8) 4, 5
29 U.S.C. § 653(b)(4) 29
29 U.S.C. § 655 5
29 U.S.C. § 655(b)(5) 3, 4
29 U.S.C. § 655(f) 4, 7, 10, 21
29 U.S.C. § 660(a) 2
30 U.S.C. § 843(b)(3) 27
42 U.S.C. § 7410(a)(6) 27

Regulations

29 C.F.R. § 1910.1043 .....4, 6, 7, 27

Other Authorities

Legislative History of the Occupational Safety and Health Act of 1970 5
Davis, Administrative Law Treatise § 6:36 (2d Ed. 1978)..... 22
Hart & Wechsler, Federal Courts (2 Ed. 1973) 24
Jaffe, Judicial Control of Administrative Action (1965)..... 21

IN THE

Supreme Court of the United States

OCTOBER TERM 1979

No. . . . . .

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

The textile industry petitioners hereby petition for a writ of certiorari to review the judgment of the United States Court of Appeals for the District of Columbia Circuit in this case.[1]

---

[1] The textile industry petitioners are listed on the title page of this Petition. The United States Court of Appeals for the District of Columbia Circuit is hereafter referred to as the Court of Appeals or the District of Columbia Circuit.

OPINIONS BELOW

The opinion of the Court of Appeals has not yet been reported.[2] The regulation in question[3] and the statement of reasons which accompanied it appear at 43 Fed. Reg. 27350-99 (June 19, 1978), as amended at 43 Fed. Reg. 28473-74 (June 30, 1978), and 43 Fed. Reg. 35032-35 (August 8, 1978), and 43 Fed. Reg. 56892-94 (December 5, 1978).

JURISDICTION

The judgment of the Court of Appeals was entered on October 24, 1979.[4] On November 7, 1979 the petitioners filed a timely petition for rehearing which was denied on January 11, 1980.[5] The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1) and 29 U.S.C. § 660(a).

QUESTIONS PRESENTED

1. (a) Whether the Court should resolve the conflict between the District of Columbia Circuit and the Fifth, Sixth and Seventh Circuits as to the showing OSHA must make to demonstrate that its standards are economically feasible;

(b) Whether the statutory requirement that compliance with an OSHA standard must be "economically feasible" can be satisfied merely by the agency's conclusion that the standard will not put the affected industry out of business; and

(c) If the only limit on OSHA's rulemaking authority is that each standard must not by itself put the affected in-

---

[2] See Slip Opinion, (App. 19-102).
[3] (App. 1-18).
[4] (App. 19-102).
[5] (App. 103). On January 22, 1980 the Court of Appeals ordered that the mandate be issued forthwith. (App. 106-107).

dustry out of business, is the Act an unconstitutional delegation of legislative power.

2. Should the Court resolve the conflict between the District of Columbia Circuit and the Fifth Circuit as to whether the Act, construed as a cohesive whole, requires OSHA to demonstrate that a standard is reasonably necessary and that there is some reasonable relationship between the benefits sought to be secured from a standard and the cost of obtaining them.

3. Whether the standard of review should continue to require a finding of substantial evidence in support of the agency's conclusions, and if so, whether the reviewing court has adequately discharged its constitutional and statutory duties when it considers only the agency's articulation of conclusions and thus relieves the agency of its duty to furnish substantial and reliable evidence in support of those conclusions.

4. Whether OSHA has the implied authority to require employers to guarantee the wages and benefits of employees who transfer to jobs warranting lower pay when the transfers result from the employees' inability to wear respirators.

STATUTES AND REGULATIONS INVOLVED

Section 6(b)(5) of the Occupational Safety and Health Act of 1970, 29 U.S.C. § 655(b)(5), provides:

> The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, *to the extent feasible, on the basis of the best available evidence,* that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this sub-

> section shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, *other considerations shall be* the latest available scientific data in the field, *the feasibility of the standards,* and experience gained under this and other health and safety laws. (Emphasis added).

Section 3(8) of the Act, 29 U.S.C. § 652(8), provides:

> The term 'occupational safety and health standard' means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, *reasonably necessary or appropriate* to provide safe or healthful employment and places of employment. (Emphasis added).

Section 6(f) of the Act, 29 U.S.C. § 655(f) provides in pertinent part:

> The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

29 C.F.R. § 1910.1043 (1978)[6]

STATEMENT OF THE CASE

A. The Statutory Framework

The Occupational Safety and Health Act of 1970 (the "Act")[7] authorizes the Secretary of Labor (the "Secretary"), acting through the Occupational Safety and Health Administration (OSHA) to promulgate occupational safety and health standards. When formulating a standard under Section 6(b)(5)[8] of the Act, OSHA may lawfully require only

---

[6] (App. 1-18).
[7] 29 U.S.C. § 651 *et seq.*
[8] 29 U.S.C. § 655(b)(5).

such measures which are shown to be feasible and practical.[9]

The Act does not give the Secretary unbridled discretion to promulgate standards without regard to the need for, or the cost of, the standard. Instead, OSHA is authorized to promulgate standards only if they are "reasonably necessary or appropriate to provide safe or healthful employment and places of employment." 29 U.S.C. §§ 652(8), 655.

Thus, Section 6(b)(5), taken together with Section 3(8) imposes certain limits on OSHA's authority to regulate. Indeed, the requirements that standards must be "feasible" and must respond to "material impairment" were added because some Senate proponents of occupational safety and health legislation felt that, without these limitations, OSHA's regulatory authority was too broad and not sufficiently circumscribed by practical limits.[10] Finally, Section 6(f) gives the determinations of the Secretary finality only if supported by "substantial evidence" in the underlying record.

B. The Cotton Dust Standard

Cotton dust is not a carcinogen.[11] The purported purpose of the standard for occupational exposure to cotton dust is to reduce the prevalence of byssinosis, a respiratory condition associated with exposure to cotton dust. Two basic characteristics of that condition must be remembered. First, the overwhelming majority of persons exposed to cotton dust exhibit no symptoms of byssinosis.[12] Second, for those who

---

[9] Legislative History of the Occupational Safety and Health Act of 1970, 92d Congress 1st Sess. (Comm. print 1971) (herein cited as Legislative History), remarks of Senator Dominick, p. 502.

[10] Legislative History, pp. 169, 197, 242, 480.

[11] Slip Opinion, p. 18, n. 35 (App. 36).

[12] *See, e.g.*: "Byssinosis: A Study of 10133 Textile Workers," Imbus. Exhibit 6, No. 18 (App. 108); Supplement to Whitworth's statement, Exhibit 42b (App. 124); Statement of Dr. Charles F. Martin, Exhibit 46, (App. 126).

do exhibit symptoms, the condition begins as a mild, reversible one which can become chronic and irreversible only after years of additional exposure.[13]

The standard sets exposure limits for the amount of cotton dust per cubic meter of air which may permissibly be present in the workroom.[14] For the cotton textile manufacturing industry, the standard establishes permissible exposure limits of 0.2 milligrams of lint-free respirable cotton dust per cubic meter of air (0.2 mg/m^3) in "yarn manufacturing" operations. The exposure limit is 0.75 mg/m^3 in "slashing and weaving" operations. These limits are slightly higher than the concentration of microscopic particulate matter in the ambient air of the average urban and suburban area.[15]

The standard requires employers to achieve the permissible exposure limits within four years solely through the installation of engineering or work practice controls, unless the employer carries an affirmative burden of establishing that such controls are not "feasible" in his operations, in which case respirators may be used.[16] Additionally, the standard imposes numerous ancillary requirements for employee exposure monitoring, medical surveillance, work practices, respirators, training and warning signs.[17] One such provision, the wage guarantee provision, provides that employees who are unable to wear respirators may transfer jobs and that employers must continue their wages and

---

[13] *See, e.g.*, Exhibit 2, 41 Fed. Reg. 56500 (1976) (App. 137), 43 Fed. Reg. 27354.

[14] 29 C.F.R. § 1910.1043(c). "Lint-free respirable cotton dust" means particles of "cotton dust" not visible to the human eye, with a diameter of approximately 15 microns or less. (App. 2).

[15] 43 Fed. Reg. 27359 (1978).

[16] 43 Fed. Reg. 27385 (1978).

[17] 29 C.F.R. § 1910.1043(d), (e), (f), (g), (h), (i), (j), (k), (l) (App. 3-17). This standard replaces one which has been in effect since 1971 and which set an exposure limit of 1.0 mg/m^3.

benefits at their previous rate even if their new job warrants a lower wage rate.[18]

OSHA promulgated the standard on June 19, 1978. Petitions for review of the standard were filed in the Fourth, Fifth, Sixth, Seventh and District of Columbia Circuits. Pursuant to 28 U.S.C. § 2112(a), all petitions were transferred to and consolidated in the District of Columbia Circuit. The basis of that court's jurisdiction was 29 U.S.C. § 655(f).

In the court below, petitioners challenged the entire standard as invalid principally for the reasons that:

> (1) Compliance with it was not economically feasible;
>
> (2) Compliance with the standard was not technologically feasible and could not be achieved within the four year period set by the standard; and
>
> (3) OSHA failed to demonstrate that the standard was reasonably necessary to protect against material impairment of health and refused even to consider whether the benefits sought to be secured from the standard were justified by the enormous cost of attempting to achieve them.

Petitioners also challenged the wage guarantee provision as beyond OSHA's statutory authority.

C. The Economic Evidence And The Decision That The Standard Is Economically Feasible

OSHA stated that the cost of complying with its cotton dust standard would be $550 million for the textile industry. There is no evidence anywhere in the record that cost of complying with the severe standard actually promulgated will be anywhere near that low.

---

[18] 29 C.F.R. § 1910.1043(f)(2)(v) (App. 8-9).

Fairly summarized, the record establishes the following with respect to the economic consequences of imposing this standard. First, OSHA's economic feasibility contractor, the Research Triangle Institute (RTI), estimated that it would cost the textile industry $1.112 billion just to satisfy the exposure limit set by the standard for yarn manufacturing operations.[19] Second, Hocutt and Thomas, leading experts in the supply of dust control and related equipment estimated the capital cost of the exposure limits proposed by industry to be $250 million.[20] Third, Hocutt and Thomas calculated capital costs of $550 million for certain other assumed exposure limits which differed from those proposed by industry but which were still materially less stringent than the limit OSHA actually promulgated.[21] Finally, the industry showed that, even though compliance was not technologically feasible, the cost of attempting to comply with the standard OSHA promulgated will approach, and perhaps exceed, $2.7 billion, a sum which OSHA admits is not economically feasible.[22]

Even though OSHA promulgated more stringent, and sub-

---

[19] RTI estimated capital costs of $984.4 million for a 0.2 mg/m³ limi for the operations of opening through spinning and $127.7 million for a 0.2 mg/m³ limit for the operations of twisting through warping [Ex. 6, No. 76, pp. I-15, V-28 (App. 139, 140)]. 43 Fed. Reg. 27371 (1978). The total estimate for a 0.2mg/m³ limit in yarn manufacturing is thus $1.112 billion. This does not include any cost for satisfying the limits set for slashing and weaving.

[20] Those limits were 0.5 mg/m³ for yarn manufacturing operations and 1.0 mg/m³ for slashing and weaving operations. Ex. 60, Att. 1; Ex. 62, Att. 1 (App. 154, 156).

[21] Those limits were 0.2 mg/m³ in the operations from opening through roving, 0.5 mg/m³ in spinning through warping and 1.0 mg/m³ in slashing and weaving. Ex. 60, Att. 1; Ex. 62, Att. 1 (App. 154, 156).

[22] As originally proposed, the standard would set a 0.2 mg/m³ exposure limit for all textile operations. RTI estimated this would cost $2.7 billion. In its briefs in the Court of Appeals, OSHA admitted that this was not economically feasible.

stantially more costly, exposure limits, it inexplicably used the $550 million estimate, made for a far different standard, as its estimate for the cost of its much more severe standard. No evidence linked the $550 million figure with the standard to which OSHA attached it. Nonetheless, it was this figure on which OSHA based its finding that, even though the standard would likely result in an undefined number of plant closures, it would not put the entire industry out of business. On that basis alone, OSHA concluded that the standard was economically feasible.[23]

The record also establishes that there is an equally effective, but considerably less expensive, alternative to the standard OSHA promulgated. The alternative, which would cost the textile industry in excess of $250 million, has been demonstrated to provide benefits at least as effective as those which OSHA seeks to secure from imposing the exposure limits set by the standard.[24] No matter which figure is

---

[23] Industry challenged OSHA's use of the $550 million cost estimate, but the Court of Appeals sustained OSHA's decision to use this figure on the basis of a rationale expressed by OSHA's counsel in its briefs and not expressed by the agency, that the equipment Hocutt and Thomas assumed would be installed and an unspecified "little more" would achieve the stringent limits OSHA set. Slip Opinion, p. 47, n. 136. (App. 65). The court cited OSHA's brief on appeal as the only support for this critical finding. Reliance on this *post hoc* rationale is mistaken not only because it is factually erroneous but also because it is not part of the agency action under review. SEC v. Chenery Corp., 332 U.S. 194 (1947).

[24] Based on a 1970-71 study of 2000 employees in one company (the Merchant Study), OSHA predicts that its standard will result in a byssinosis prevalence rate of 12%. 43 Fed. Reg. 27355 (1978) Based on several more recent studies of more than 28,000 employees in five companies, the industry showed that its alternative likely would produce a prevalence rate of between 1% and 6%, obviously much lower than that predicted by the Merchant Study. Ex. 42, 42b, 46 and 47 (App. 157, 124, 126, 172). The industry alternative included a combination of medical surveillance, less stringent exposure limits than those set by OSHA, selective respirator use and removal from exposure as medically appropriate.

used as the cost of OSHA's standard, ($.55 billion, $1.112 billion or $2.7 billion), it exceeds tremendously the cost of the industry alternative.

The Court of Appeals held that an OSHA standard is economically feasible if it is not prohibitively expensive in the sense that it will not put an entire industry out of business and thereupon sustained this standard as economically feasible.[25] Having adopted this extreme and unprecedented definition of economic feasibility as the only limit on OSHA's power to regulate, the Court of Appeals went on to hold that OSHA is not required either to confine its standards to those it can show to be reasonably necessary or to demonstrate, even as a part of feasibility, that there exists any reasonable relation between the benefits sought to be secured from a standard and the cost of complying with it.[26]

Thereby, the Court of Appeals eliminated all of the practical limitations imposed by Sections 6(b)(5) and 3(8) of the Act, and in effect has held that so far as feasibility is concerned, OSHA may promulgate any standard it chooses so long as it concludes that its choice will not destroy an entire industry.

D. The Standard Of Review Applied By The Court Of Appeals To Sustain Economic Feasibility And The Four Year Compliance Period

Section 6(f) of the Act requires that OSHA standards are to be given finality only if they are supported by substantial evidence on the record considered as a whole.[27] The Court of Appeals paid lip service to the substantial evidence test but, in fact, sustained this standard by devising a novel and patently dangerous concept of the function of the reviewing

---

[25] Slip Opinion, pp. 49-51 (App. 67-69).
[26] Slip Opinion, pp. 51-59 (App. 69-77).
[27] 29 U.S.C. § 655(f).

court. In doing so it managed to confine its responsibility to the mere determination of whether the agency had articulated adequately the basis for its actions and refused meaningfully to assess the record as a whole.[28] Thus, the Court of Appeals misapprehended or grossly misapplied the substantial evidence test, depriving petitioners of their right to judicial review.[29]

The application of this new concept of review lead to the Court's strained and unsupported findings on feasibility. By accepting at face value OSHA's determination of the cost of compliance, it erroneously adopted cost estimates which were clearly applicable only to a far less stringent standard than that imposed. By accepting at face value OSHA's conclusion that the "industry would be able to pass compliance costs on to consumers" it made a finding contrary to all the evidence on that subject. The "evidence" cited by the Court of Appeals in support of this conclusion was an *assumption* made by RTI solely for the purpose of analyzing the effect on the industry if it could pass on the cost of compliance to the consumers.[30] Significantly, the same report recognized that if costs could not be passed on:

> . . . in the absence of price increases, profit-after-taxes and ROI would be very small or negative in some cases.[31]

---

[28] This approach to review has been criticized by respected authorities because it transforms the substantial evidence test from a check on the substance of agency action to a procedural hurdle which merely duplicates the requirement of an adequate statement of reasons. *See* pp. 20-25, *infra*.

[29] The misapprehension or gross misapplication of the substantial evidence test is grounds for granting a petition for a writ of certiorari. *See, e.g.*, National Labor Relations Bd. v. Baptist Hospital, Inc., 99 S.Ct. 2598 (1979).

[30] Slip Opinion, p. 49, n. 145 (App. 67); *see* Ex. 6, No. 76, pp. VI-8-VI-9, VI-39 (App. 141, 144).

[31] Ex. 6, No. 76, p. VI-37 (App. 143).

The critical and undisputed fact was that RTI simply did not attempt to determine whether costs could be passed on to the consumer. Had the Court of Appeals reviewed applicable portions of the record even in a most cursory manner, it certainly would not have elevated an analytical assumption to the status of evidence. Moreover, other evidence demonstrated that pressure from competition with cheap foreign imports and the availability of synthetic yarns as a substitute made it likely that the costs of compliance could not be passed along to consumers.[32]

The decision to sustain the four year compliance period is another strikingly clear example of how the Court of Appeals was led astray by its novel concept of its responsibility to "review" the agency's conclusions. Previous decisions in the District of Columbia Circuit had held that the agency must make a "reasoned prediction" from facts in the record that compliance is feasible within the compliance period.[33]

The simple fact is that no evidence in the record supported feasibility of the four year period. This is perhaps best illustrated by OSHA's failure to explain why it chose four years except to state that:

> [a] period of three to four years for implementation throughout industry is eminently reasonable and achievable.[34]

---

[32] Ex. 6, No. 76, pp. C-35, C-48, C-52 and Tables C-20, C-25 and C-27 (App. 145-51); Tr. 2565-71 (App. 198-201); Ex. 63 (App. 188).

[33] *See, e.g.,* Industrial Union Dept. v. Hodgson, 162 U.S. App. D.C. 331, 344, 499 F.2d 467, 480 (1974); International Harvester v. Ruckelshaus, 155 U.S. App. D.C. 411, 425, 478 F.2d 615, 629 (1973).

[34] 43 Fed. Reg. 27385 (1978). Even though OSHA acknowledged that the capability of the dust control supply industry was critical to the time allowed for compliance, it ignored the only evidence from those suppliers which established that it would take *eleven* years to

The Court of Appeals upheld the four year period as a reasonable accommodation of "competing needs"[35] without even examining the evidence in the record which addressed the time required for compliance. However, OSHA has never suggested that it chose the four year period as an accommodation between competing needs.

Because it expressly declined to become familiar with basic elements of the evidence, the court sustained the critically important finding of economic feasibility on the misfitted cost estimates and upheld a period of compliance which has not a shred of evidence to support it.

REASONS FOR GRANTING THIS PETITION

This petition raises issues which are especially needful of determination by the Court in this time of ever expanding regulatory power and ever contracting economic resources with which to respond to the regulations promulgated in the exercise of that power. The petition calls upon the Court to resolve two basic conflicts between the circuits on the nature and extent of OSHA's power to affect the allocation of the economic resources of American industry. It also asks the Court to correct a novel and patently dangerous concept of the function of reviewing courts when performing the judicial function they necessarily must perform if, as intended by Congress, the courts are to serve as a check on the exercise of agency power. Finally, the petition requests the court to nullify OSHA's unauthorized attempt to guarantee wages of employees in contradiction to the expressed intent of Congress.

---

manufacture enough equipment to comply even with exposure limits much less stringent than those set by the standard. Wrenn Tr. 103 (App. 195). Ex. 60, pp. 18-19 (App. 153); *see also* Hocutt Tr. 2514-15, 2488-89 (App. 196-198).

[35] Slip Opinion, p. 76 (App. 94).

1. There Is A Conflict Among The Circuits As To The Showing OSHA Must Make To Establish That Its Standards Are Economically Feasible.

It is now well-settled that OSHA must demonstrate, by substantial evidence, that compliance with the standard is economically feasible.[36] The decision in this case conflicts with decisions of the Courts of Appeals for the Fifth, Sixth and Seventh Circuits as to the meaning of the critically important term "feasible."[37]

In this case the District of Columbia Circuit interpreted the feasibility requirement of Section 6(b)(5) to mean that an OSHA standard will be sustained, as economically feasible, merely upon the agency's conclusion that the standard is not prohibitively expensive in the sense that it will not put the entire industry out of business.[38] While "the actual test for economic feasibility has yet to be fully developed,"[39] three other Courts of Appeals have held that OSHA must do much more to demonstrate economic feasibility.

In *Florida Peach Growers Assn.* v. *Dept. of Labor,* 489 F.2d 120, 130 (5th Cir. 1974), the court held that OSHA must demonstrate that the standard will not cause widespread business failure and consequent unemployment and

---

[36] *See, e.g.,* American Petroleum Institute v. OSHA, 581 F.2d 493 (5th Cir. 1978) cert. granted *sub nom,* Marshall v. American Petroleum Institute, 440 U.S. 906 (1979); AFL-CIO v. Brennan, 530 F.2d 109, 121-22 (3d Cir. 1976); Industrial Union Dept. v. Hodgson, 162 U.S. App. D.C. 331, 341-42, 499 F.2d 467, 477-78 (1974). OSHA concedes that it has this obligation. Slip Opinion, p. 35 (App. 53); 43 Fed. Reg. 27361 (1978).

[37] American Petroleum Institute v. OSHA, 581 F.2d 493 (5th Cir. 1978); RMI Co. v. Secretary of Labor, 594 F.2d 566 (6th Cir. 1979); Turner Co. v. Secretary of Labor, 561 F.2d 82 (7th Cir. 1978); AFL-CIO v. Brennan, 530 F.2d 109 (3d Cir. 1975). Although RMI and Turner are enforcement cases, both courts have defined the term feasible. *See,* pp. 15-16, infra.

[38] Slip Opinion, pp. 49, 51 (App. 67, 69).

[39] Slip Opinion, p. 49 (App. 67).

held that OSHA must establish a satisfactory "... balance between the protection afforded by the requirement and the effect upon economic and market conditions in the industry." *Id.* at 132.

More recently, the Fifth Circuit invalidated a finding of economic feasibility based merely on the conclusion that the standard would not threaten the viability of the industry or the national economy. *American Petroleum Institute* v. *OSHA*, 581 F.2d 493, 503 (5th Cir. 1978). There the court held that, at least, OSHA must demonstrate a reasonable relationship between the cost of the standard and the benefits expected from it. *Id.* at 503.

The definition of economic feasibility adopted by the District of Columbia Circuit is wholly inconsistent with the decision of the Courts of Appeals for the Sixth and Seventh Circuits, both of which have defined economic feasibility to require a showing that the benefits of a standard are in proportion to its costs. Although the cases before both courts involved enforcement, rather than pre-enforcement review, of a standard, both courts were called upon to interpret the term "feasible." The Sixth Circuit held:

> But neither will controls necessarily be economically feasible merely because the employer can easily (or otherwise) afford them. In order to justify the expenditure, there must be a reasonable assurance that there will be an appreciable and corresponding improvement in working conditions... We only insist that the Secretary,... weigh the costs of compliance against the benefits expected to be achieved thereby in order to determine whether a proposed remedy is economically feasible. *RMI Co.* v. *Secretary of Labor*, 594 F.2d 566, 573 (6th Cir. 1979).

The Seventh Circuit reached a similar conclusion in *Turner*

Co. v. *Secretary of Labor,* 561 F.2d 82, 85 (7th Cir. 1977).[40]

Admittedly, these three courts differ, to some extent, as to what showing OSHA must make to prove the economic feasibility of its standards. Nonetheless, all three require OSHA to do more than merely conclude that the standard will not result in the demise of the affected industry. Thus, they conflict directly with the extreme interpretation of economic feasibility adopted in this case by the District of Columbia Circuit. This conflict is so basic to the future application of this Act that the Court should resolve it even if unconvinced that any of the four decisions correctly or fully express the proper test of economic feasibility.[41]

Wholly apart from the need to resolve the conflict, this petition should be granted to settle the important issue of what OSHA must show to prove economic feasibility. This case demonstrates the necessity for a firmer and more precise definition of this critically important term.

Neither affected industries nor the national economy can afford a rule of law which says that OSHA can promulgate a standard merely upon the conclusion that the standard alone will not destroy the affected industry. Petitioners contend that at, a minimum, OSHA must:

---

[40] *But see,* American Iron and Steel Institute v. OSHA, 577 F.2d 825 (3d Cir. 1978) (affirming the coke oven emissions standard), petitions for cert. pending, Nos. 78-918, 78-919. Even the Third Circuit has required that, at a minimum, OSHA must establish the extent to which the standard would force companies in the industry out of business and must evaluate the effect of the standard on the industry structure and the ability of the industry to meet its competition. AFL-CIO v. Brennan, 530 F.2d 123 (3d Cir. 1975).

[41] Petitioners respectfully suggest below what they believe to be a reasonable test which will permit OSHA to fulfill the objectives of the Act within the limits imposed by Congress and without jeopardizing the future of industry.

(i) base its economic analysis on a reasonably accurate estimate of the cost to comply with the standard it promulgates;

(ii) show by reliable evidence—not by assumptions—that industry can either absorb the expected compliance costs or pass these costs on to consumers;

(iii) demonstrate the extent to which its standard will force business failure especially where, as here, OSHA admits that the standard will force an undefined number of companies out of business and show that the standard will not affect adversely the structure of the industry or its ability to meet its competition; and

(iv) demonstrate that there exists a reasonable relationship between the cost of its standard and the benefits it is expected to yield especially where, as here, there is available an equally effective but materially less expensive, alternative.

These elements are practical and reasonable criteria of feasibility by any definition of the term. It is essential, in a time of expanding and expensive regulation, that OSHA be required to do more than conclude that a standard will not put an entire industry out of business. There must be realistic criteria to guide OSHA and the Courts of Appeals in the allocation of the limited, and ever contracting, resources of industry. This issue is of critical importance in this case to the textile industry. It is equally important to the national economy. Petitioners respectfully ask the Court to settle it.

In fact, the Court's previous decisions appear to require the interpretation suggested by petitioners if the Act is to remain as a constitutionally permissible delegation of legislative authority. *National Cable Television Assn.* v. *United* States, 415 U.S. 336, 342 (1974).

Congress inserted the feasibility requirement in Section 6(b)(5) as a criterion for setting standards. Senator Javits,

who authored the amendment inserting the feasibility requirement, explained:

> As a result of this amendment the Secretary, in setting standards, is expressly required to consider feasibility of proposed standards. This is an improvement over the Daniels bill, which might be interpreted to require absolute health and safety in all cases, regardless of feasibility, and the Administration bill, which contains no criteria for standards at all.[42]

The District of Columbia Circuit has announced the rule that a standard is feasible if it will not put an entire industry out of business.[43] This interpretation makes meaningless the criteria set by Section 6(b)(5) and confers on OSHA unlimited legislative power to regulate the national economy.

For instance, this interpretation leaves OSHA free to establish the criteria by which it will judge whether an industry will survive its regulation. Also, it allows OSHA to decide, without any criteria whatsoever, whether the failure of one or two companies in an industry comprised of four companies (like the automobile industry) will or will not be an acceptable sacrifice in pursuit of OSHA's goals. Likewise, in a multi-company industry (like the textile industry), OSHA is empowered to decide whether 10 or 100 or 1,000 business failures are acceptable. Indeed, so long as OSHA leaves one company in business, it can satisfy the test adopted by the District of Columbia Circuit.[44]

---

[42] S. Rep. No. 91-1282, 91st Cong., 2d Sess., at 58; Legis. Hist. at 197. We assume, without admitting, that the term feasible is an adequate standard for the exercise of the delegated legislative power.

[43] Slip Opinion, pp. 49-51 (App. 67-69).

[44] Until the Court effectively resolves the conflicts between the District of Columbia Circuit and other circuits as to the issues in this case, the outcome of judicial review will depend more on fleetness of foot in the race to the courthouse under 28 U.S.C. § 2112 than on the merits of the case as measured by a uniform rule of law. For example, in this case, petitions for review were filed in the Fourth, Fifth, Sixth, Seventh and District of Columbia Circuits.

The consequence of this rule is staggering when one remembers that OSHA is empowered to set standards for virtually every industry in the nation. Under this rule OSHA is empowered to decide, industry by industry, the ultimate structure and configuration of each industry subject to the Act so long as OSHA concludes that any one standard will not end the existence of the industry. It was precisely this unfettered discretion to restructure the entire economy that made it necessary for the Court to strike the statute as unconstitutional in *A.L.A. Schechter Poultry Corp.* v. *United States,* 295 U.S. 495 (1935) and *Panama Refining Co.* v. *Ryan,* 293 U.S. 388 (1935).

As interpreted by the District of Columbia Circuit, Section 6(b)(5) is an unconstitutional delegation of legislative power. Perhaps a more narrow interpretation of the statute, such as that here suggested by petitioners, will avoid the constitutional problems. However, if the District of Columbia Circuit's interpretation is correct, petitioners submit that the unconfined delegation to OSHA in the Act must be stricken as unconstitutional.

2. There Is A Conflict Between The Circuits As To Whether OSHA Must Demonstrate The Existence Of A Reasonable Relation Between The Costs Of A Standard And The Benefits Expected From It And As To Whether OSHA Must Demonstrate A Reasonable Necessity For The Standard.

Petitioners argued below that, under the Act construed as a cohesive whole and particularly because of Sections 3(8) and 6(b)(5), OSHA must demonstrate that its standard is reasonably necessary and must establish the existence of a reasonable relationship between the cost of a standard and the benefits expected from it. OSHA admittedly did not make

those showings here and, in fact, denied that it was obligated to do so.[45]

Confronted with an almost identical situation in *American Petroleum,* the Fifth Circuit set aside the benezene standard because, *inter alia,* OSHA failed to show that its standard was reasonably necessary or to establish "whether the benefits expected from the standard bear a reasonable relationship to the costs imposed by the standard."[46]

The District of Columbia Circuit explicitly rejected the Fifth Circuit's decision in *American Petroleum* and held that OSHA is not required to prove reasonable necessity or to make a ". . . determination that the costs of a standard bear a 'reasonable' relationship to its benefits."[47] This creates a clear conflict between these two circuits on a critical issue inherent in the agency rulemaking process. Petitioners respectfully submit that the conflict should be resolved in favor of the interpretation of the Fifth Circuit.

3. This Case Presents The Important Question Of The Proper Role Of The Reviewing Court Under The Substantial Evidence Standard Of Review.

It is clear that OSHA's standards are valid only if supported by substantial evidence "in the record considered as a whole."[48] In *Universal Camera Corp.* v. *N.L.R.B.,* 340 U.S. 474 (1951), the Court held that, when reviewing agency actions under the substantial evidence test, courts

---

[45] OSHA takes the view that it need only find that the expected benefits are likely to be "appreciable." 43 Fed. Reg. 27379 (1978).

[46] 581 F.2d 493, 503 (5th Cir. 1978), cert. granted *sub nom* Marshall v. American Petroleum Institute, 440 U.S. 906 (1979), argued orally on October 10, 1979. *See also,* Florida Peach Growers Assn. v. Dept. of Labor, 489 F.2d 120, 130 (5th Cir. 1974).

[47] Slip Opinion, p. 56 (App. 74). This conflict may be resolved by the Court's decision in American Petroleum.

[48] 29 U.S.C. § 655(f).

should guard against abdication of "the conventional judicial function."[49] Thereupon, it charged them with the duty to review and analyze the evidence and to determine whether the evidence on which the agency acted was substantial when considered in perspective of other evidence which fairly detracts from the evidence on which the agency relied.[50]

The substantial evidence test is considered generally to require that the reviewing court review and analyze the substance of agency action even in complex evidentiary matters, including questions of technology and economics.[51] This is especially important in applying the substantial evidence test as defined by *Universal Camera* because, only by analyzing the relevant evidence, can the reviewing court determine whether the evidence on which the agency relied is substantial when considered in view of the detracting force of other evidence.

However, in this case, the District of Columbia Circuit defined its role in very different and much more limited terms, taking the novel view that the reviewing court should remain detached and apart from the evidence, especially where it concerns questions of technology and economics. The decision below cited the applicable precedent defining

---

[49] 340 U.S. at 490.

[50] 340 U.S. at 490, 487-88. This does not mean that the Court must in the traditional sense weigh the evidence, but as will be shown below it requires the court to analyze and evaluate the force of technical and economic evidence.

[51] Universal Camera Corp. v. N.L.R.B., *supra; See also,* Ethyl Corp. v. EPA, 176 U.S. App. D.C. 373, 541 F.2d 1, 67 (1976); International Harvester v. Ruckelshaus, 55 U.S. App. D.C. 411, 478 F.2d 615 (D.C. Cir. 1973); Portland Cement Assoc v. Ruckelshaus, 158 U.S. App. D.C. 308, 486 F.2d 375 (1973); Greater Boston Television Corp. v. FCC, 143 U.S. App. D.C. 383, 444 F.2d 841 (1970), cert. denied 403 U.S. 923 (1971); American Iron & Steel Institute v. OSHA, 577 F.2d 825 (3d Cir. 1978); Associated Industries v. Dept. of Labor, 487 F.2d 342 (2d Cir. 1973). *See generally,* Jaffe, Judicial Control of Administrative Action, pp. 600-613 (1965).

the substantial evidence test.[52] However, it defined in very narrow terms the court's role in reviewing OSHA's technological and economic determinations:

> From their stance outside of both scientific and political debates, *courts can help to ensure that decisionmakers articulate the basis for their decisions.* But once courts step beyond that role and endeavor to judge the merits of competing expert views, they leave the terrain they know. Slip Opinion, p. 27, n. 66 (emphasis added). [Citing *Ethyl Corp.* v. *EPA*, 541 F.2d 1, 67 (D.C. Cir. 1976) (Bazelon, C.J., and McGowan, J., concurring); *Internat'l Harvester Co.* v. *Ruckelshaus*, 478 F.2d 615, 652 (D.C. Cir. 1973) (Bazelon, C.J., concurring in result)].

A respected commentator on administrative law has termed this uncritical substantive review, which has been developed in several concurring opinions of Judge Bazelon, as the "Bazelon heterodoxy" and has condemned it as legally inadequate. Davis, Administrative Law Treatise, § 6:36, p. 607 (2d Ed. 1978).[53] This criticism is also reflected in the decision in *Ethyl Corp.* v. *EPA*, 541 F.2d 1, 68-69 (D.C. Cir. 1976) wherein Judge Leventhal observed in a concurring opinion:

> Taking [Judge Bazelon's] opinion in its fair implication, as a signal to judges to abstain from any substantive review, it is my view that while giving up is the easier course, it is not legitimately open to us at present.
>
> * * *
>
> . . . Better no judicial review at all than a charade that gives the imprimatur without the substance of judicial confirmation that the agency is not acting unreasonably.

[52] Slip Opinion, pp. 20-28 (App. 38-46).

[53] In fact, under the Bazelon heterodoxy, the court is not required to analyze technical or economical evidence at all. Ethyl Corp. v. EPA, 541 F.2d 1, 67 (D.C. Cir. 1976), concurring opinion of Bazelon, C.J.

> Once the presumption of regularity in agency action is challenged with a factual submission, and even to determine whether such a challenge has been made, the agency's record and reasoning has to be looked at. If there is some factual support for the challenge, there must be either evidence or judicial notice available explicating the agency's result, or a remand to supply the gap. 541 F.2d 1 at 68, 69 (Leventhal, J., concurring).

The District of Columbia Circuit now has subscribed to the Bazelon heterodoxy as the proper measure of judicial review to be accorded this standard and indeed all subsequent OSHA standards. Consequently, when called upon to review OSHA's technical and economic findings, the District of Columbia Circuit confined its responsibility to a determination of whether the agency adequately *articulated* reasons for its findings.

This case demonstrates that such restricted judicial review is wholly inadequate. For instance, because the court refused to analyze the economic evidence, it sustained the finding of economic feasibility on the basis of an assumption and sanctioned an economic analysis made on a cost estimate that did not reflect the cost of the standard. Likewise, the court sustained the four year compliance period without even considering the evidence addressed to that issue.[54]

These examples show that by too narrowly defining its role the court sustained the agency's findings on two critical issues when there was actually *no evidentiary support* for OSHA's findings. This is because the cosmetic test adopted by the District of Columbia Circuit required OSHA to articulate, but not to support, its findings. These examples also show that the test applied in this case rendered illusory peti-

---

[54] *See*, pp. 12-13, *supra*.

tioners' entitlement to exacting judicial review of standards which strike at the heart of their economic future.

The task of proper review may be difficult and demanding but, unless the reviewing court examines and analyzes the evidence to which its attention is called, the entire regulatory system becomes a charade in which evidence is placed in the record only to be ignored and public participation in rulemaking is made meaningless.[55]

The adoption of such a restricted standard of judicial review by the District of Columbia Circuit has great practical significance for it places a cloud over the future application of the substantial evidence test in all administrative law cases.[56] This is especially true because the unorthodox rule was adopted by the District of Columbia Circuit, the court which reviews more administrative agency actions than the rest of the Courts of Appeals combined.

Petitioners submit that the reviewing court does not necessarily have to comb the entire record compiled in the rulemaking process, but it should be required to examine and analyze the conflicting technical and economic evidence brought to its attention by the parties on appeal, and it must determine whether the evidence which the agency cites as support for its actions is, in fact, substantial when considered in perspective of other evidence which fairly detracts from that cited by the agency. Likewise, petitioners submit that

---

[55] Indeed, petitioners' right to review is of constitutional proportions. The Court has indicated numerous times that Congress could not totally preclude judicial review consistently with due process. Crowell v. Benson, 285 U.S. 23, 47 (1932); Yakus v. United States, 321 U.S. 414 (1944); *See* Hart & Wechsler, Federal Courts 2d Ed. pp. 339-40 (1973). The illusory review below was in essence a denial of review in violation of petitioners' due process rights under the Fifth Amendment.

[56] Of course, it affected adversely the outcome of this case which is one of critical importance to the entire textile industry.

the reviewing court is obligated to discern whether the "evidence" cited by the agency is, in fact, reliable evidence—not just assumptions or unsupported opinions. It is beyond question that in evaluating evidence the courts have expertise far superior to that of administrative agencies.

In sum, when Congress required that OSHA standards be reviewed under the substantial evidence test it obligated the Courts of Appeals to accept their proper role in implementing that test. Constitutionally adequate judicial review under the standard set by Congress leaves no room for escape from the necessity to review technical and economic evidence. Consequently, due process is satisfied only when the reviewing court accepts this responsibility. The District of Columbia Circuit failed to provide the kind of review to which petitioners are entitled and thereby deprived them of due process of law.

4. The Wage Guarantee Provision Exceeds OSHA's Statutory Authority.

The standard provides that when a physician determines that an employee is unable to wear a respirator the employee shall be given the opportunity to transfer to another position and that:

> The employer shall assure an employee who is transferred *due to an inability to wear a respirator suffers no loss of earnings or other employment rights or benefits* as a result of the transfer. 43 Fed. Reg. 27396 ¶ (f)(2)(v) (emphasis added).

OSHA explained that:

> . . . [T]he goal of this provision is to minimize any ad-

> verse economic impact on the employee by virtue of the inability to wear a respirator.[57]

OSHA's notions of economic fairness resulted in a rule which would require employers to guarantee the wages of these employees without any finding of actual health impairment and even if the inability to wear a respirator were wholly unrelated to cotton dust exposure. Petitioners respectfully submit that OSHA simply does not have the authority under the Act to impose wage guarantees, particularly when the goal of such provisions is economic rather than health related.

No one contends that the Act expressly confers upon OSHA the authority to regulate wages or other employment benefits. As OSHA concedes:

> It is true that the . . . Act contains no language which either explicitly requires or expressly authorizes the inclusion of [wage guarantee provisions] in OSHA health standards. 43 Fed. Reg. 52976 (1978).

This alone should be determinative, for when Congress has

---

[57] 43 Fed. Reg. 27387 (1978). OSHA also stated:

> It is manifestly unfair that employees who are unable to wear respirators suffer loss of jobs or other *economic detriment* because their employers have not yet achieved compliance with the engineering control requirements of the standard, but are relying instead on the interim and less effective device of respirators. During the multi-year period prior to the full implementation of engineering controls, this risk of *adverse economic impact* on employees is a real one. Accordingly, we conclude that where the employer is relying upon respirators as the means of limiting worker exposure, his or her compliance obligation must include the obligation to assure that employees who are unable to wear respirators not suffer any *economic detriment. Id.* [Emphasis added].

intended to give to an agency authority to regulate wages and other benefits, it has done so in explicit terms.[58]

The court below held that OSHA has implied authority to guarantee wages. It found the authority in Section 3(8), which it construed as impliedly authorizing OSHA to regulate wages and other benefits.[59]

This interpretation of the Act is fundamentally at odds with the expressed intent of Congress to withhold from OSHA authority to regulate pay or other benefits. *Whirlpool Corp.* v. *Marshall,* 48 U.S.L.W. 4189 (February 26, 1980) addressed this point authoritatively:

> It is also important to emphasize that what primarily troubled Congress about the Daniels bill's 'strike with pay' provision was its requirement that employees be paid their regular salary after having properly invoked their right to refuse to work under the section. It is instructive that virtually every time the issue of an employee's right to absent himself from hazardous work was discussed in the legislative debates, it was in the context of the employee's right to continue to receive his usual compensation.

---

[58] For example, the Federal Coal Mine Health and Safety Act of 1969, as amended by the Federal Mine Safety and Health Amendments Act of 1977, authorizes miners to elect to transfer jobs for specified health reasons and specifically provides that: "[a]ny miner so transferred shall receive compensation for such work at not less than the regular rate of pay received by him immediately prior to his transfer." 30 U.S.C. § 843(b)(3). Similarly, the Clean Air Act Amendments of 1977 include an explicit mandate for employee earnings protection. *See* 42 U.S.C. § 7410(a)(6).

[59] Slip Opinion, pp. 77-80 (App. 95-98). The Court of Appeals ignored OSHA's statement that the goal of the provision was economic fairness and constructed a health nexus for the provision by adopting the *post hoc* rationale of OSHA's counsel that the possibility of a disadvantageous transfer "may" cause the employee to refrain from disclosing health impairment. Slip Opinion, p. 79. (App. 97). In any event, this rationale is inadequate since it is inability to wear a respirator, *not* health impairment that triggers the wage guarantee provision. 29 C.F.R. § 1910.1043(f)(2)(v) (App. 8-9).

> When it rejected the 'strike with pay' concept, therefore, Congress very clearly meant to reject a law unconditionally imposing upon employers an obligation to continue to pay their employees their regular pay checks when they absented themselves from work for reasons of safety. 48 U.S.L.W. at 4193-94 (footnotes omitted).

Thus, *Whirlpool* is dispositive of OSHA's contention that Congress intended to confer on it authority to impose wage guarantees on employers.[60] The wage guarantee provision in this standard unconditionally imposes on employers the obligation to continue unchanged an employee's wages and other benefits when the employee cannot wear a respirator and thus transfers to a job requiring lesser skills and warranting lesser wages. Clearly, if Congress refused explicitly to authorize continued pay even where the employee absented himself from work for reasons of safety, it cannot be said impliedly to have authorized continued pay merely because the employee cannot wear a respirator.

The intent of Congress not to give OSHA authority to order wage guarantees is further expressed in Section 4(b)(4) of the Act:

> Nothing in this Chapter shall be construed *to supersede or in any manner affect any workmen's compensation law* or to enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the court of, employment. 29 U.S.C. § 653(b)(4) [emphasis added].

The wage guarantee provision requires employers to pay a

[60] Whirlpool is especially applicable to the present case because the rejected "strike with pay" provision discussed in Whirlpool would have guaranteed wages of employees who absented themselves from exposure to potentially toxic substances. 48 U.S.L.W. at 4192, n. 20.

transferred employee one hundred percent of his pre-transfer wages and other benefits. If, as petitioners believe, there is no nexus between material impairment of health and the wage guarantee provision, that provision is clearly unauthorized. If, as the court below held, such a nexus does exist, then the wage guarantee provision has a direct and severe effect on state workmen's compensation laws and thereby contradicts the intent of Congress expressed in Section 4(b)(4) of the Act.

Thus, Section 4(b)(4) of the Act underscores the clear message given by Congress' rejection of the "strike with pay" provision. Congress did not either expressly or impliedly authorize OSHA to promulgate the wage guarantee provision. It is vital that the Court set aside the provision and thereby enforce the limits on OSHA's delegated power.

CONCLUSION

For all the foregoing reasons the petition for a writ of certiorari should be granted.

Respectfully submitted,

AMERICAN TEXTILE
MANUFACTURERS
INSTITUTE, INC.

By: /s/ ROBERT H. BORK

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511
(203) 624-6027

By: /s/ GREGORY B. TOBIN

GREGORY B. TOBIN
Ogletree, Deakins, Smoak,
Stewart & Edwards
3920 First National Bank Tower
Atlanta, GA 30303
(404) 588-1300

By: /s/ JOHN S. BATTLE, JR.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, VA 23219
(804) 644-4131

MILLIKEN AND COMPANY

By: /s/ ROBERT T. THOMPSON

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building-Suite 2222
Greenville, S. C. 29602
(803) 242-3200

ARKWRIGHT MILLS

By: /s/ THOMAS A. EVINS

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
(803) 582-5630

SPARTAN MILLS

By: /s/ JOSEPH K. MADDOX, JR.

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S. C. 29304
(803) 574-0211

BLAIR MILLS, INC.

By: /s/ ROBERT T. THOMPSON

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building-Suite 2222
Greenville, S. C. 29602
(803) 242-3200

HERMITAGE, INC.

By: /s/ ROBERT T. THOMPSON

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building
Suite 2222
Greenville, S. C. 29602
(803) 242-3200

DAN RIVER, INC.

By: /s/ ROGER L. TUTTLE

ROGER L. TUTTLE
2291 Memorial Drive
Danville, VA 24541
(804) 799-7121

CONE MILLS CORPORATION

By: /s/ SAMUEL K. ABRAMS

SAMUEL K. ABRAMS
BRIAN E. MORAN
Baker & Hostetler
1776 K Street, N.W.
Suite 900
Washington, D. C. 20006
(202) 293-6260

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
1201 Maple Street
Greensboro, N. C. 27405
(919) 279-6567

MAYFAIR MILLS

By: /s/ THOMAS A. EVINS

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
(803) 582-5630

SPRINGS MILLS, INC.

By: /s/ DAN M. BYRD, JR.

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S. C. 29715
(803) 547-2901

RIEGEL TEXTILE CORPORATION

By: /s/ FRED M. RICHARDSON

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
Constangy, Brooks & Smith
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, GA 30303
(404) 525-8622

FIELDCREST MILLS, INC.

By: /s/ JOHN S. BATTLE, JR.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, VA 23219
(804) 644-4131

WEST POINT-PEPPERELL, INC.

By: /s/ RICHARD H. MONK, JR.

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, GA 31833
(205) 756-7111

CERTIFICATE OF SERVICE

The undersigned, who certifies that he is a member of the bar of this Court, hereby certifies that on this 14th day of March, 1980, a copy of the foregoing Petition for a Writ of Certiorari filed by the American Textile Manufacturers Institute, Inc., Milliken & Company, Arkwright Mills, Spartan Mills, Blair Mills, Inc., Hermitage, Inc., Dan River, Inc., Cone Mills Corporation, Mayfair Mills, Springs Mills, Inc., Riegel Textile Corporation, Fieldcrest Mills, Inc. and West Point-Pepperell, Inc. was mailed, postage prepaid, to each of the following persons at the addresses indicated below:

Charles M. Crump, Esq.
Apperson, Crump, Duzane & Maxwell
2610-100 North Main Building
Memphis, Tennessee 38103

Carl W. Vogt, Esq.
Fulbright & Jaworski
1150 Connecticut Avenue, N.W.
Washington, D. C. 20036

Neal P. Gillen, Esq.
1701 L Street, N.W., Suite 460
Washington, D. C. 20036

J. Albert Woll, Esq.
815 Sixteenth Street, N.W.
Washington, D. C. 20006

George H. Cohen, Esq.
Jeremiah A. Collins, Esq.
Bredhoff, Gottesman, Cohen & Weinberg
1000 Connecticut Avenue, N.W.
Washington, D. C. 20036

Arthur M. Goldberg, Esq.
15 Union Square
New York, New York 10003

John A. Bryson, Esq.
Allen H. Feldman, Esq.
United States Department of Labor
Room S4004
200 Constitution Avenue, N.W.
Washington, D. C. 20210

Wade H. McCree, Jr.
Solicitor General
Department of Justice
Washington, D. C. 20530

By /s/ ROBERT E. PAYNE

Supreme Court, U. S.
FILED
MAR 14 1980
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM 1979

Nos. ..79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondents.

APPENDIX TO PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511
Counsel for American Textile Manufacturers Institute, Inc.

GREGORY B. TOBIN
OGLETREE, DEAKINS, SMOAK, STEWART & EDWARDS
3920 First National Bank Tower
Atlanta, Georgia 30303
Counsel for American Textile Manufacturers Institute, Inc.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, Virginia 23219
Counsel for American Textile Manufacturers Institute, Inc.
and for
Fieldcrest Mills, Inc.

(Counsel list continued on inside cover)

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Milliken and Company

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
Counsel for Arkwright Mills

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S. C. 29304
Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Blair Mills, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Hermitage, Inc.

ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541
Counsel for Dan River, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
Baker & Hostetler
1776 K Street, N.W.
Suite 900
Washington, D. C. 20006
Counsel for Cone Mills Corporation

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
1201 Maple Street
Greensboro, N. C. 27405
Counsel for Cone Mills Corporation

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
Counsel for Mayfair Mills

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S. C. 29715
Counsel for Springs Mills, Inc.

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
Constangy, Brooks & Smith
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303
Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, Georgia 31833
Counsel for West Point-Pepperell, Inc.

TABLE OF CONTENTS

Appendix page

The Cotton Dust Standard (29 C.F.R. § 1910.43) 1

AFL-CIO v. Marshall and Cotton Warehouse Assoc. v. Marshall, Nos. 78-1562, 78-1736 (D. DC, filed Oct. 29, 1974), slip opinion 19

Order denying petitions for rehearing, filed Jan. 11, 1980..... 103

Order denying suggestions for rehearing *en banc*, filed Jan. 11, 1980 104

Order directing Clerk to issue mandate, filed Jan. 22, 1980.... 106

OSHA Exhibit 6, No. 18, "Byssinosis—A Study of 10,133 Textile Workers," by Imbus and Suh 108

OSHA Exhibit 42B, Supplemental Submission to Statement and Testimony of Jack W. Whitworth, M.D. 124

OSHA Exhibit 46, Statement of Charles F. Martin, M.D..... 126

OSHA Exhibit 2, Cotton Dust—Proposed Standards for Exposure and Notice of Hearing, p. 56500 137

OSHA Exhibit 6, No. 76, Excerpts from Technological Feasibility Assessment and Final Inflationary Impact Statement 138

OSHA Exhibit 60, Statement of Hovan Hocutt, pp. 18-19, Attachment #1 152

OSHA Exhibit 62, Statement of Arthur Thomas, Attachment #1 155

OSHA Exhibit 42, Statement of Jack W. Whitworth, M.D..... 157

OSHA Exhibit 47, Statement of Harold R. Imbus, M.D., SC.D. 172

OSHA Exhibit 63, Statement of John P. Figh 188

Wrenn Transcript page 103 195

Hocutt Transcript pages 2488-89 196

Hocutt Transcript pages 2514-15 197

Figh Transcript pages 2566-71 198

CHAPTER XVII—OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

§ 1910.1043 Cotton dust.

(a) *Scope and application.* (1) This section applies to the control of employee exposure to cotton dust in all workplaces, except as provided in paragraph (a)(2) of this section.

(2) This section does not apply to: (i) The harvesting of cotton; (ii) the ginning of cotton (Exposure to cotton dust in cotton ginning is covered by § 1910.1046); (iii) maritime operations covered by 29 CFR Parts 1915, 1916, 1917, 1918; (iv) the handling or processing of woven or knitted materials; and (v) the handling or processing of washed cotton.

(3) This section provides mandatory requirements for the control of employee exposure to cotton dust. The mandatory nature of these requirements is not intended, however, to discourage or inhibit the development of different, equally effective means of providing the required protection. The variance provisions of section 6(d) of the Act, and the implementing regulations in Part 1905 of this Title, provide a mechanism for employers to obtain variances from the provisions of this section where the employer has developed alternative procedures which are "as safe and healthful as" those required by this section. As implemented by the procedural regulations in Part 1905 of this Title, the variance provisions of the Act permit the flexibility which contributes to efficient compliance with the standard. To aid in the expeditious processing of variance applications, the procedures allow, where appropriate, for the grant of interim orders pending a decision on the merits of the variance as well as for the consideration of variances applicable to groups of employers. OSHA encourages interested em-

ployers to utilize the variance provisions of the Act where equally safe and healthful protective means are available.

(b) *Definitions.* For the purpose of this section:

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor or designee;

"Blow down" means the cleaning of equipment and surfaces with compressed air.

"Cotton dust" means dust present in the air during the handling or processing of cotton, which may contain a mixture of many substances including ground up plant matter, fiber, bacteria, fungi, soil, pesticides, non-cotton plant matter and other contaminants which may have accumulated with the cotton during the growing, harvesting and subsequent processing or storage periods. Any dust present during the handling and processing of cotton through the weaving or knitting of fabrics, and dust present in other operations or manufacturing processes using new or waste cotton fibers or cotton fiber by-products from textile mills are considered cotton dust.

"Director" means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health, Education, and Welfare, or designee;

"Lint-free respirable cotton dust" means particles of cotton dust of approximately 15 microns or less aerodynamic equivalent diameter;

"Vertical elutriator cotton dust sampler" means a dust sampler which has a particle size cut-off at approximately 15 microns aerodynamic equivalent diameter when operating at the flow rate of 7.4 ± 0.2 liters per minute;

"Yarn manufacturing" means all textile mill operations from opening to, but not including, slashing and weaving;

"Washed cotton" means cotton which has been thoroughly washed in hot water and is known in the cotton textile trade

as purified or dyed. Washed cotton does not include steamed, autoclaved cotton or cotton washed solely in solvents.

(c) *Permissible exposure limits.* (1) the employer shall assure that no employee who is exposed to cotton dust in yarn manufacturing is exposed to airborne concentrations of lint-free respirable cotton dust greater than 200 ug/m^3 mean concentration, averaged over an eight-hour period, as measured by a vertical elutriator or a method of equivalent accuracy and precision.

(2) The employer shall assure that no employee who is exposed to cotton dust in the textile processes known as slashing and weaving is exposed to airborne concentrations of lint-free respirable cotton dust greater than 750 ug/m^3 mean concentration, averaged over an eight hour period, as measured by a vertical elutriator or a method of equivalent accuracy and precision.

(3) The employer shall assure that no employee who is exposed to cotton dust (except for exposures in yarn manufacturing and slashing and weaving covered by paragraphs (c)(1) and (c)(2) of this section is exposed to airborne concentrations of lint-free respirable cotton dust greater than 500 ug/m^3 mean concentration, averaged over an eight-hour period, as measured by a vertical elutriator or a method of equivalent accuracy and precision.

(d) *Exposure monitoring and measurement*—(1) *General.* (i) For the purposes of this section, employee exposure is that exposure which would occur if the employee were not using a respirator.

(ii)) The sampling device to be used shall be either the vertical elutriator cotton dust sampler or a method of equivalent accuracy and precision.

(iii) If an alternative to the vertical elutriator cotton dust sampler is used, the employer shall establish equivalency by demonstrating that the alternative sampling

devices;

(*a*) Collect respirable particulates in the same range as the vertical elutriator (approximately 15 microns);

(*b*) Replicate exposure data in side-by-side field comparisons; and

(*c*) Are equivalent within an accuracy and precision range of plus or minus 25 percent for 95 percent of the samples over the range of 0.5 to 2 times the permissible exposure limit.

(2) *Initial monitoring.* Each employer who has a place of employment in which cotton dust is present, shall conduct monitoring by obtaining measurements which are representative of the exposure of all employees to airborne concentrations of lint-free respirable cotton dust over an eight-hour period. The sampling program shall include at least one determination during each shift for each work area.

(3) *Periodic monitoring.* (i) The employer shall repeat the measurements required by paragraph (d)(2) of this section at least every six months.

ii) Whenever there has been a production, process, or control change which may result in new or additional exposure to cotton dust, or whenever the employer has any other reason to suspect an increase in employee exposure, the employer shall repeat the monitoring and measurements required by paragraph (d)(2) of this section for those employees affected by the change or increase.

(4) *Employee notification.* (i) Within five working days after the receipt of monitoring results, the employer shall notify each employee in writing of the exposure measurements which represent that employee's exposure.

(ii) Whenever the results indicate that the employee's exposure exceeds the applicable permissible exposure limit specified in paragraph (c) of this section, the employer shall include in the written notice a statement that the per-

missible exposure limit was exceeded and a description of the corrective action taken to reduce exposure below the permissible exposure limit.

(e) *Methods of compliance*—(1) *Engineering and work practice controls.* The employer shall institute engineering and work practice controls to reduce and maintain employee exposure to cotton dust at or below the permissible exposure limit specified in paragraph (c) of this section, except to the extent that the employer establishes that such controls are not feasible.

(2) Whenever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the permissible exposure limit, the employer shall nonetheless institute these controls to immediately reduce exposure to the lowest feasible level, and shall supplement these controls with the use of respirators which shall comply with the provisions of paragraph (f) of this section.

(3) *Compliance program.* (i) Each employer shall establish and implement a written program sufficient to reduce exposures to or below the permissible exposure limit solely by means of engineering controls and work practices as required by paragraph (e)(1) of this section.

(ii) The written program shall include at least the following:

(*a*) A description of each operation or process resulting in employee exposure to cotton dust;

(*b*) Engineering plans and other studies used to determine the controls for each process;

(*c*) A report of the technology considered in meeting the permissible exposure limit;

(*d*) Monitoring data obtained in accordance with paragraph (d) of this section;

(*e*) A detailed schedule for development and implementation of engineering and work practice controls, including

exposure levels projected to be achieved by such controls;

(*f*) Work practice program; and

(*g*) Other relevant information.

(iii) The employer's schedule as set forth in the compliance program, shall project completion of the compliance program no later than September 4, 1982,

(iv) The employer shall complete the steps set forth in his program by the dates in the schedule.

(v) Written programs shall be submitted, upon request, to the Assistant Secretary and the Director, and shall be available at the worksite for examination and copying by the Assistant Secretary, the Director, and any affected employee or their designated representatives.

(vi) The written programs required under paragraph (e)(3) of this section shall be revised and updated at least every six months to reflect the current status of the program and current exposure levels.

(4) *Mechanical ventilation.* When mechanical ventilation is used to control exposure, measurements which demonstrate the effectiveness of the system to control exposure, such as capture velocity, duct velocity, or static pressure shall be made at least every six months. Measurements of the system's effectiveness to control exposures shall also be made within five days of any change in production, process or control which may result in any increase in airborne concentrations of cotton dust.

(f) *Use of respirators*—(1) *General.* Where the use of respirators is required under this section, the employer shall provide, at no cost to the employee, and assure the use of respirators which comply with the requirements of this paragraph (f). Respirators shall be used in the following circumstances:

(i) During the time periods necessary to install or implement feasible engineering controls and work practice controls;

(ii) During maintenance and repair activities in which engineering and work practice controls are not feasible;

(iii) In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the permissible exposure limit; and

(iv) In operations specified under paragraph (g)(1).

(v) Whenever an employee requests a respirator.

(2) *Respirator selection.* (i) Where respirators are required under this section, the employer shall select the appropriate respirator from Table 1 below and shall assure that the employee uses the respirator provided.

TABLE I

Cotton dust concentration	*Required respirator*
Not greater than—	
(a) 5 × the applicable permissible exposure limit.	1. Any dust respirator, including single use.
(b) 10 × the applicable permissible exposure limit.	1. Any dust respirator, except single use or quarter mask; or 2. Any supplied air respirator; or 3. Any self-contained breathing apparatus.
(c) 100 × the applicable permissible exposure limit.	1. High efficiency particulate filter respirator with a full facepiece; or 2. Any supplied air respirator with full-facepiece, helmet or hood; or 3. Any self-contained breathing apparatus with full-facepiece.
(d) Greater than 100 × the applicable permissible exposure limit.	1. A powered air-purifying respirator with high efficiency particulate filter; or 2. A self-contained breathing apparatus with a full-facepiece op-

Cotton dust concentration	*Required respirator*
	erated in pressure demand or other positive pressure mode; or 3. A type "C" supplied air respirator operated in pressure demand or other positive pressure mode; or 4. A combination respirator which includes a type C supplied-air respirator with a full-facepiece operated in pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure demand or other positive pressure mode.

(ii) The employer shall select respirators from those tested and approved for protection against dust by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

(iii) Whenever respirators are required by this section for concentrations not greater than 5 x the applicable permissible exposure limit, the employer shall provide and permit the employee to use, at the employee's option, single use dust respirator in preference to any respirator specified in paragraph (a) of Table 1.

(iv) Whenever respirators are required by this section for concentrations not greater than 100 x the applicable permissible exposure limit, the employer shall, upon the request of the employee, provide a powered air purifying respirator with a high efficiency particulate filter in lieu of the respirator specified in paragraphs (a), (b), or (c) of Table I.

(v) Whenever a physician determines that an employee is unable to wear any form of respirator, including a power

air purifying respirator, the employee shall be given the opportunity to transfer to another position which is available or which later becomes available having a dust level at or below the PEL. The employer shall assure than an employee who is transferred due to an inability to wear a respirator suffers no loss of earnings or other employment rights or benefits as a result of the transfer.

(vi) Until March 4, 1979, the employer shall provide any dust respirator, including single use, to all employees exposed to cotton dust, unless the employer has conducted the monitoring required by paragraph (d)(2) of this section or otherwise has monitored employee exposure. As soon as monitoring has been conducted, the employer shall select the appropirate respirator from Table I.

(3) *Respirator program.* The employer shall institute a respirator program in accordance with § 1910.134 (b), (d), (e), and (f) of this part.

(4) *Respirator usage.* (i) The employer shall assure that the respirator used by each employee exhibits minimum facepiece leakage and that the respirator is fitted properly.

(ii) The employer shall allow each employee who uses a filter respirator, to change the filter elements whenever an increase in breathing resistance is detected by the employee. The employer shall maintain an adequate supply of filter elements for this purpose.

(iii) The employer shall allow employees who wear respirators to wash their faces and respirator face pieces to prevent skin irritation associated with respirator use.

(g) *Work practices.* Each employer shall, regardless of the level of employee exposure, immediately establish and implement a written program of work practices, which shall minimize cotton dust exposure for each specific job. Where applicable, the following work practices shall be included in the work practices program:

(1) Compressed air "blow down" cleaning shall be prohibited, where alternative means are feasible. Where compressed air "blow down" is done, respirators shall be worn by the employees performing the "blow down", and employees in the area whose presence is not required to perform the "blow down" shall be required to leave the area during this cleaning operation.

(2) Cleaning of clothing or floors with compressed air shall be prohibited.

(3) Floor sweeping shall be performed with a vacuum or with methods designed to minimize dispersal of dust.

(4) Cotton and cotton waste shall be stacked, sorted, baled, dumped, removed or otherwise handled by mechanical means, except where the employer can show that it is infeasible to do so. Where infeasible, the method used for handling cotton and cotton waste shall be the method which reduces exposure to the lowest level feasible.

(5) The employer shall inspect, clean, maintain, and repair, all engineering control equipment and ventilation systems including power sources, ducts, and filtration units of the equipment.

(h) *Medical surveillance*—(1) *General.* (i) Each employer who has a place of employment in which cotton dust is present shall institute a program of medical surveillance for all employees exposed to cotton dust.

(ii) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided without cost to the employee.

(iii) Persons other than licensed physicians, who administer the pulmonary function testing required by this section shall complete a NIOSH approved training course in spirometry.

(2) *Initial examinations.* The employer shall provide each employee who is or may be exposed to cotton dust with an opportunity for medical surveillance. For new employees this examination shall be provided prior to initial assignment. The medical surveillance shall include at least the following:

(i) A medical history;

(ii) The standardized questionnaire contained in Appendix B; and

(iii) A pulmonary function measurement, including a determination of forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV_1), and the percentage that the measured values of FEV and FVC differ from the predicted values, using the standard tables in Appendix C. The predicted FEV_1 and FVC for blacks shall be multiplied by 0.85 to adjust for ethnic differences.

These determinations shall be made for each employee before the employee enters the workplace on the first day of the work week, following at least 35 hours after previous exposure to cotton dust. The tests shall be repeated during the shift, no sooner than 4 and no more than 10 hours after the beginning of the work shift; and, in any event, no more than one hour after cessation of exposure.

(iv) Based upon the questionnaire results, each employee shall be graded according to Schilling's byssinosis classification system.

(3) *Periodic examinations.* (i) The employer shall provide annual medical surveillance for all employees exposed to cotton dust which shall include at least an update of the medical history and standardized questionnaire (the abbreviated questionnaire, App. B-III) and the pulmonary function measurements in paragraph (h)(2) of this section.

(ii) Medical surveillance as required in paragraph (h)

(3)(i) of this section shall be provided every six months for all employees in the following categories:

(*a*) An FEV_1 of greater than 80 percent of the predicted value, but with an FEV_1 decrement of 5 percent or 200 ml. on a first working day;

(*b*) An FEV_1 of less than 80 percent of the predicted value; or

(*c*) Where, in the opinion of the physician, any significant change in questionnaire findings, pulmonary function results, or other diagnostic tests has occurred.

(ii) An employee whose FEV_1 is less than 60 percent of the predicted value shall be referred to a physician for a detailed pulmonary examination.

(iv) A comparison shall be made between the current examination results and those of previous examinations and a determination made by the physician as to whether there has been a significant change.

(4) *Information provided to the physician.* The employer shall provide the following information to the examining physician:

(i) A copy of this regulation and its Appendices;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's exposure level or anticipated exposure level;

(iv) A description of any personal protective equipment used or to be used; and

(v) Information from previous medical examinations of the affected employee which is not readily available to the examining physician.

(5) *Physician's written opinion.*

(i) The employer shall obtain and furnish the employee

with a copy of a written opinion from the examining physician containing the following:

(*a*) The results of the medical examination and tests;

(*b*) The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from exposure to cotton dust;

(*c*) The physician's recommended limitations upon the employee's exposure to cotton dust or upon the employee's use of respirators including a determination of whether an employee can wear a negative pressure respirator, and where the employee cannot, a determination of the employee's ability to wear a powered air purifying respirator; and

(*d*) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

(ii) The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposure.

(i) *Employee education and training* — (1) *Training program.* (i) The employer shall provide a training program for all employees in all workplaces where cotton dust is present, and shall assure that each employee in these workplaces is informed of the following:

(*a*) The specific nature of the operations which could result in exposure to cotton dust at or above the permissible exposure limit;

(*b*) The measures, including work practices required by paragraph (g) of this section, necessary to protect the employee from exposures in excess of the permissible exposure limit;

(*c*) The purpose, proper use and limitations of respirators required by paragraph (f) of this section;

(*d*) The purpose for and a description of the medical surveillance program required by paragraph (h) of this section and other information which will aid exposed employees in understanding the hazards of cotton dust exposure; and

(*e*) The contents of this standard and its appendices.

(ii) The training program shall be provided prior to initial assignment and shall be repeated at least annually.

(2) *Access to training materials.* (i) Each employer shall post a copy of this section with its appendices in a public location at the workplace, and shall, upon request, make copies available to employees.

(ii) The employer shall provide all materials relating to the employee training and information program to the Assistant Secretary and the Director upon request.

(iii) In addition to the information required by paragraph (i)(1) of this section, the employer shall include as part of the training program, and shall distribute to employees, any materials, pertaining to the Occupational Safety and Health Act, the regulations issued pursuant to that Act, and this cotton dust standard, which are made available to the employer by the Assistant Secretary.

(j) *Signs.* The employer shall post the following warning sign in each work area where the permissible exposure limit for cotton dust is exceeded:

WARNING
COTTON DUST WORK AREA
MAY CAUSE ACUTE OR DELAYED LUNG INJURY
(BYSSINOSIS)
RESPIRATORS
REQUIRED IN THIS AREA

(k) *Recordkeeping*—(1) *Exposure measurements.* (i) The employer shall establish and maintain an accurate record of all measurements required by paragraph (d) of this section.

(ii) The record shall include: (*a*) A log containing the items listed in paragraph IV (a) of Appendix A, and the dates, number, duration, and results of each of the samples taken, including a description of the procedure used to determine representative employee exposures;

(*b*) The type of protective devices worn, if any, and length of time worn; and

(*c*) The names, social security numbers, job classifications, and exposure levels of employees whose exposure the measurement is intended to represent.

(iii) The employer shall maintain this record for at least 20 years.

(2) *Medical surveillance.* (i) The employer shall establish and maintain an accurate medical record for each employee subject to medical surveillance required by paragraph (h) of this section.

(ii) The record shall include:

(*a*) The name and social security number and description of the duties of the employee;

(*b*) A copy of the medical examination results including the medical history, questionnaire responses, results of all tests, and the physician's recommendation;

(*c*) A copy of the physician's written opinion;

(*d*) Any employee medical complaints related to exposure to cotton dust;

(*e*) A copy of this standard and its appendices, except that the employer may keep one copy of the standard and the appendices for all employees, provided that he references

the standard and appendices in the medical surveillance record of each employee; and

(*f*) A copy of the information provided to the physician as required by paragraph (h)(4) of this section.

(iii) The employer shall maintain this record for at least 20 years.

(3) *Availability.* (i) The employer shall make all records required to be maintained by paragraph (k) of this section available to the Assistant Secretary and the Director for examination and copying.

(ii) The employer shall make employee exposure measurement records required by this section available to affected employees or their designated representatives for examination and copying.

(iii) The employer shall make all records indicating a former employee's own exposure to cotton dust available to the former employee or his designated representative for examination and copying.

(iv) The employer shall make an employee's medical records required to be maintained by this section, available to the affected employee or former employee or to a physician or other individual designated by such affected employee or former employees, for examination and copying.

(4) *Transfer of records,* (i) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by paragraph (k) of this section.

(ii) Whenever the employer ceases to do business, and there is no successor employer to receive and retain the records for the prescribed period, these records shall be transmitted to the Director.

(iii) At the expiration of the retention period for the records required to be maintained by this section, the em-

ployer shall notify the Director at least 3 months prior to the disposal of such records and shall transmit those records to the Director if he requests them within that period.

(l) *Observation of monitoring.* (1) The employer shall provide affected employees or their designated representatives an opportunity to observe any measuring or monitoring of employee exposure to cotton dust conducted pursuant to paragraph (d) of this section.

(2) Whenever observation of the measuring or monitoring of employee exposure to cotton dust requires entry into an area where the use of personal protective equipment is required, the employer shall provide the observer with and assure the use of such equipment and shall require the observer to comply with all other applicable safety and health procedures.

(3) Without interfering with the measurement, observers shall be entitled to:

(i) An explanation of the measurement procedures;

(ii) An opportunity to observe all steps related to the measurement of airborne concentrations of cotton dust performed at the place of exposure; and

(iii) An opportunity to record the results obtained.

(m) *Effective date*—(1) *General.* This section is effective September 4, 1978, except as otherwise provided below.

(2) *Startup dates.* (i) *Initial monitoring.* The initial monitoring required by paragraph (d)(2) of this section shall be completed as soon as possible but no later than March 4, 1979.

(ii) *Methods of compliance: Engineering and work practice controls.* The engineering and work practice controls required by paragraph (e) of this section shall be implemented no later than September 4, 1982.

(iii) *Compliance program.* The compliance program re-

quired by paragraph (e)(3) of this section shall be established no later than September 4, 1979.

(iv) *Respirators.* The respirators required by paragraph (f) of this section shall be provided no later than October 4, 1978. Until March 4, 1979, the provisions of paragraph (f)(2)(vi) apply.

(v) *Work practices.* The work practices required by paragraph (g) of this section shall be implemented no later than December 4, 1978.

(vi) *Medical surveillance.* The medical surveillance required by paragraph (h) of this section shall be completed no later than September 4, 1979.

(vii) *Employee education and training.* The initial education and training required by paragraph (i) of this section shall be completed as soon as possible but no later than December 4, 1978.

(n) *Appendices.* (i) Appendices B, C, and D to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(ii) Appendix A contains information which is not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

Notice: This opinion is subject to formal revision before publication in the Federal Reporter or U.S.App.D.C. Reports. Users are requested to notify the Clerk of any formal errors in order that corrections may be made before the bound volumes go to press.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 78-1562

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, *et al.*, PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*, RESPONDENTS

No. 78-1736

COTTON WAREHOUSE ASSOCIATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, U.S. DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, U.S. DEPARTMENT OF LABOR

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

No. 78-1979

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS; INDUSTRIAL UNION DEPARTMENT, AFL-CIO; AND AMALGAMATED CLOTHING AND TEXTILE WORKERS UNION, AFL-CIO, CLC, INTERVENORS

No. 78-1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AFL-CIO, ETC., INTERVENORS

No. 78-1981

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AFL-CIO, ETC., INTERVENORS

No. 78-1982

MILLIKEN AND COMPANY, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR AND DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, RESPONDENTS

No. 78-1983

ARKWRIGHT MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1984

SPARTAN MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1986

BLAIR MILLS, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1987

HERMITAGE, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1988

DAN RIVER, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1989

CONE MILLS CORPORATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1990

MAYFAIR MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1991

SPRINGS MILLS, INC., PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1992

RIEGEL TEXTILE CORPORATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1993

FIELDCREST MILLS, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY OF LABOR, AND DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2013

AMERICAN COTTON SHIPPERS ASSOCIATION, PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2014

NATIONAL COTTONSEED PRODUCTS ASSOCIATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2016

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2018

WEST POINT-PEPPERELL, INC., PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR AND
EULA BINGHAM, ASSISTANT SECRETARY OF LABOR,
RESPONDENTS

Argued February 14, 1979

Decided October 24, 1979

Judgment entered this date ←

George H. Cohen with whom *Robert M. Weinberg, Jeremiah A. Collins, David M. Silberman, Laurence Gold, Judith Kincaid, J. Albert Woll, Elliot Bredhoff* and *Arthur M. Goldberg* were on the brief, for AFL-CIO, et al. petitioner in No. 78-1562, and intervenors in Nos. 78-1979, 78-1980 and 78-1981.

Robert E. Payne with whom *John S. Battle, Jr., Gregory B. Tobin, Edward W. Warren* and *Arthur F. Sampson III* were on the brief, for petitioners American Textile Manufacturers Institute, Inc., et al. in Nos. 78-1562, 78-1979, 78-1980, 78-1981 and 78-1993.

Harlan H. Huntley and *Roger L. Tuttle* were on the brief, for petitioner Dan River, Inc. in No. 78-1988.

Robert T. Thompson with whom *Gary S. Klein* was on the brief, for petitioner Milliken and Company in Nos. 78-1982, 78-1986 and 78-1987.

Samuel K. Abrams and *Brian E. Moran* were on the brief, for petitioner Cone Mills Corp. in No. 78-1989.

Before BAZELON, *Senior Circuit Judge*, and TAMM and ROBINSON, *Circuit Judges*.

Opinion for the Court filed by *Senior Circuit Judge* BAZELON.

BAZELON, *Senior Circuit Judge*: These consolidated petitions [1] for review challenge a new permanent health standard limiting occupational exposure to cotton dust,[2] which was promulgated by regulation on June 19, 1978 by the Occupational Safety and Health Administration of the Department of Labor (OSHA), under section 6(b)(5) of the Occupational Safety and Health Act of 1970 (the Act).[3] OSHA's action, which rests on its determination that occupational exposure to cotton dust presents a material health hazard to workers, is attacked by

---

[1] Petitions in addition to those on review here, *see* notes 4-6, *infra*, were filed by representatives of the cotton waste processing industries and users of cotton batting: the National Association of Bedding Manufacturers (No. 78-1784); the National Association of Furniture Manufacturers (No. 78-1796); the Textile Fibers and By-Products Association (No. 78-1985); the National Cotton Batting Institute (No. 78-2015); and, the Wolf Corporation (No. 78-2017). These petitioners were severed from this case on November 1, 1978, when OSHA suspended application of the standard to these industries. *See* 43 Fed. Reg. 38087 (1978); 44 Fed. Reg. 5438 (1979).

[2] Standard for Occupational Exposure to Cotton Dust, 43 Fed. Reg. 27350-99 (June 19, 1978), as amended, 43 Fed. Reg. 28473-74 (June 30, 1978), 43 Fed. Reg. 35032-35 (August 8, 1978), 43 Fed. Reg. 56893-94 (December 5, 1978) [hereinafter "the standard"].

[3] 83 Stat. 1594, 29 U.S.C. § 655(b) (1976). The Secretary of Labor delegated his authority to promulgate occupational safety and health standards under 29 U.S.C. § 655 (1976) to the Assistant Secretary of Labor of Occupational Safety and Health ("the Secretary"), who is the chief executive officer of OSHA. References in this opinion to "the Secretary" and "OSHA" are used interchangeably.

three groups of petitioners: (1) representatives of the cotton textile industry[4] and (2) nontextile industries[5] who claim that the standard is unwarranted and infeasible; and (3) their employee unions, who attack two provisions of the standard as too lax, but support the rest.[6] These very divergent claims reflect the wide variety of conflicting interests that make OSHA's task a difficult one. On direct review,[7] we uphold the standard except for its application to the cottonseed oil industry which we remand for clarification or reconsideration.

To assist a proper understanding of the issues, we discuss (I) the history and context of the agency's action; (II) the nature of our review under the Act; (III) the

---

[4] The textile industry petitioners include the American Textile Manufacturers Institute, Inc. (ATMI) (Nos. 78-1979, 78-1980, and 78-1981) and twelve individual companies engaged in the manufacture of textiles from cotton: Milliken and Company (No. 78-1982); Arkwright Mills (No. 78-1983); Spartan Mills (No. 78-1984); Blair Mills, Inc. (No. 78-1986); Hermitage, Inc. (No. 78-1987); Dan River, Inc. (No. 78-1988); Cone Mills Corp. (No. 78-1989); Mayfair Mills (No. 78-1990); Springs Mills, Inc. (No. 78-1991); Riegel Textile Corp. (No. 78-1992); Fieldcrest Mills, Inc. (No. 78-1993); and West Point-Pepperell, Inc. (No. 78-2018).

[5] The non-textile industries are represented by the National Cottonseed Products Association (No. 78-2014), the American Cotton Shippers Association (No. 78-2013), and the Cotton Warehouse Association (No. 78-1736). A petition also was filed on behalf of the entire cotton industry of the National Cotton Council of American (NCCA) (No. 78-2016).

[6] The employee unions are represented by the American Federation of Labor & Congress of Industrial Organizations (AFL-CIO), its Industrial Union Department, and their affiliate, the Amalgamated Clothing and Textile Workers Union (the unions) (No. 78-1562).

[7] The Act permits any person adversely affected by a health and safety standard to challenge its validity in the courts of appeals. 29 U.S.C. § 655(f) (1976).

claims of the textile industry; (IV) the claims of the non-textile industries; and (V) challenges to a few technical provisions of the standard.

I. Background

A. *Health Risks*

Health impairments associated with exposure to cotton dust range from acute but reversible reactions to irreversible, chronic obstructive pulmonary disease.[8] Cotton dust exposure can produce or aggravate respiratory symptoms characteristic of chronic bronchitis, asthma, and emphysema.[9] Further, a specific, debilitating disease has been conclusively attributed to the effect of cotton dust on the respiratory passages. This disease, named byssinosis, is more commonly known in its chronic stage as "brown lung disease."[10] This is the most serious health hazard for cotton workers.

Although the prevalence of the disease among cotton workers has been known for centuries,[11] its exact etiology

---

[8] 43 Fed. Reg. 27352, 37354 (1978).

[9] 41 Fed. Reg. 56500 (1976); 43 Fed. Reg. 27352-54 (1978).

[10] OSHA observed that "byssinosis represents a constellation of respiratory effects." 43 Fed. Reg. 27353 (1978) (citations omitted).

[11] In 1705, the Italian Bernardino Ramazzi wrote that

> those who hackle in the flax and hemp to prepare it for being spun and wove, afford frequent instances of the unwholesomeness of their trade; for there flies out of this matter a foul mischeivous powder, that entering the lungs by the mouth and throat, causes continual coughs and gradually makes way for an asthma. . . . But in the long run if they find their affliction grows upon them they must look out for another trade; for 'tis a sordid profit that's accompanied with the destruction of health.

B. Ramazzini, A Treatise of the Diseases of Tradesmen (London, 1705) (quoted in J. Merchant, *Epidemological*

is still not completely understood.[12] The subjective nature of many early symptoms[13] and variations in the composition of cotton dust[14] have compounded the uncer-

---

Studies of Respiratory Disease Among Cotton Textile Workers: 1970-1973 at 1 (1973), Joint Appendix (J.A.) (1497). *See also* 41 Fed. Reg. 56500 (1976).

[12] *E.g.*, 43 Fed. Reg. 27352 (1978); Bouhuys, Breathing Physiology, Environment and Lung, Disease, 418-25 9, J.A. 288-95.

[13] A major technique for diagnosing byssinosis is to ask individuals about their symptoms. A. Bouhuys, Byssinosis in the United States, 14-15, J.A. 230-31; S. Roach & R. Schilling, *A Clinical and Environmental Study of Byssinosis in the Lancashire Cotton Industry*, 17 BRIT. J. INDUS. MED. 1-3 (1959), J.A. 201-203. Workers who fear losing their jobs upon signs of ill-health or whose language facilities impair their ability to answer questions about their symptoms may not accurately report their health impairments.

Other workers may experience severe symptoms and yet not be diagnosed with the disease. *Compare, e.g.*, J.A. 2120 (testimony of Eva Bradshaw) ("Along about 5 or 10 years before I had to come out of the mill my chest would get so tight it felt just like an accordian that had closed down, like it was squeezed shut as tight as it would go. I coughed all the time, especially at work.") *with* J.A. 2057-58 (supplemental submission of Harold Imbus of Burlington Industries) (asserting that physicians did not diagnose Eva Bradshaw with byssinosis).

[14] The composition of cotton dust varies in different industries, plants, and stages of manufacturing. NIOSH, Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust 86-90 (1974), J.A. 98-102. NIOSH noted that recent epidemological and expimental evidence suggests that the substances causing byssinosis is some unknown biologically active material carried with the inorganic dust into the lungs of exposed workers. *Id.* at 96, J.A. at 108. But NIOSH concluded that insufficient information is available to support this theory. *Id. accord.*, J.A. 1216-17 (comments of A. Bouhuys).

[Continued]

tainties about the actual way in which cotton dust exposure causes serious health impairments.[15] Nonetheless, its progressively disabling symptoms are well documented.[16]

Typically, a person suffering from byssinosis is initially affected by irritated air passages, coughing, breathlessness, and chest tightness. These symptoms are often accompanied by decreased pulmonary functioning, evidenced by objective indicators. At first the symptoms tend to last briefly, and usually remit a few days after exposure. The symptoms recur, however, whenever an affected individual returns to a dusty environment.

---

[14] [Continued]

Therefore, OSHA applied its standard to a broad definition of cotton dust. 43 Fed. Reg. 27354. *See id.* at 27395, (to be codified at 29 C.F.R. 1910.1043(b)):

> "Cotton dust" means dust present in the air during the handling or processing of cotton, which may contain a mixture of many substances, including ground up plant matter, fiber, bacteria, fungi, soil, pesticides, non-cotton plant matter and other contaminants which may have accumulated with the cotton during the growing, harvesting and subsequent processing or storage periods. Any dust present during the handling and processing of cotton through the weaving or knitting of fabrics, and dust present in other operations or manufacturing processes using new or waste cotton fibers or cotton fiber by-products from textile mills are considered cotton dust.

[15] *E.g.*, J.A. 1214 (statement of A. Bouhuys); J.A. 317 (Hygiene Standards for Cotton Dust, British Occupational Hygiene Society Committee on Hygiene Standards); J.A. 339 (R. Schilling, Byssinosis in Cotton and Other Textile Workers). *See* 43 Fed. Reg. 27355 (citing more studies).

[16] NIOSH, Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust 23-36 (1974), J.A. 33-46 (citing studies); R. Nader, *The Cotton-Mill Killer*, THE NATION (March 15, 1971), J.A. 2435. The description of the disease that follows in text relies on these reports.

As the disease progresses, its symptoms become more pronounced and painful, resembling the effects of bronchitis and asthma. They persist throughout the work week, or period of exposure. During this stage, an affected worker may become temporarily incapacitated and may need to take short but frequent leaves from work.

When byssinosis reaches its advanced stage, the worker exhibits the symptoms of emphysema and chronic bronchitis. Ultimately, irreversible lung damage results. A worker afflicted with chronic byssinosis is forced into premature retirement, often after painful efforts to remain on the job. Such individuals must give up all activities that require any physical exertion. The permanent lung damage caused by byssinosis makes every breath painful and difficult. The excess strain these breathing difficulties place on the heart often leads to the worker's early death from heart failure.

The actual number of persons afflicted with byssinosis is not certain, but it is large. One study estimated that 35,000 people have "disabling loss of lung function related to their work in the cotton textile industry" alone.[17] The Senate Report on the Occupational Safety and Health Act stated that as many as 100,000 active or retired workers suffered from the disease in 1970.[18]

Studies in the record estimate that 250,000 to 800,000 workers are exposed daily to cotton dust and its attend-

---

[17] J.A. 1214 (statement of A. Bouhuys); *see* A. Bouhuys, *et. al*, Epidemiology of Chronic Lung Disease in a Cotton Mill Community, J.A. 3165.

[18] 91st Cong., 2d Sess. 3 (1970), *reprinted in* S. REP. No. 91-1282, LEGISLATIVE HISTORY OF THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, at 143 (1971) [hereinafter cited as LEGIS. HIST.].

it risks.[19] As the reported incidence of the disease usually ranges as high as 20-30% of the work force in cotton industries,[20] each worker faces a substantial risk of health impairment.[21]

B. *History of Cotton Dust Regulation*

Prior to the creation of OSHA, a private association of governmental industrial hygienists placed cotton dust on its tentative list of substances for which specific exposure limits should be established.[22] In 1966 this organization adopted a "threshold limit value" of 1000 micrograms per cubic meter (1000 $\mu g/m^3$) of total dust.[23]

The federal government first regulated cotton dust in 1968. At that time, the Secretary of Labor, acting pursuant to the Walsh-Healey Act,[24] promulgated a 1000 $\mu g/m^3$ maximum total dust exposure as an occupational health requirement for public contractors.[25]

---

[19] R. NADER, *supra* note 16, J.A. 2435 (estimating 250,000 textile workers exposed); Statement of Sidney M. Wolfe and Peter Greene, Public Citizen's Health Research Group, J.A. 3137 (estimating 800,000 cotton workers exposed).

[20] *See, e.g.*, J.A. 230 (20%-30% of people in carding rooms of textile mills affected with byssinosis) (A. Bouhuys, Byssinosis in the United States); J.A. 241 (20% of workings in preparation area of textile plant exhibit byssinosis symptoms) (J. Merchant, *et. al.*, Byssinosis and Chronic Bronchitis Among Cotton Textile Workers).

[21] The actual risk may vary according to the nature of the cotton dust and the extent of an individual's exposure.

[22] 43 Fed. Reg. 27351 (1978) (describing American Conference of Governmental Industrial Hygienists).

[23] *Id.*

[24] 41 U.S.C. § 35(e) (1976). *See* 43 Fed. Reg. 27351 (1978).

[25] The 1000 $\mu g/m^3$ total dust standard was based on a study that was published in 1960. Conducted by Roach and Schilling, the study examined cotton mills in Lancaster England. This study is reprinted in the Joint Appendix (J.A. at 201.

This was an interim standard adopted upon passage of the Act in 1970 in which section 6(a) required the Secretary immediately to promulgate as occupational safety or health standards all existing "established Federal Standards," including the 1000 $\mu g/m^3$ standard for cotton exposure.[26] These interim standards were intended to afford workers minimal protection until the adoption of permanent standards through OSHA's rulemaking proceedings.

On September 26, 1974, the Director of the National Institute of Occupational Safety and Health (NIOSH)[27] submitted to the Secretary of Labor a set of recommendations for regulating cotton dust. NIOSH recommended[28]

---

[26] 29 U.S.C. § 655(a) (1976). *See also* 29 U.S.C. § 652(10) (1976). Congressional concern over delays in regulating cotton dust was manifest in the legislative history of the Occupational Safety and Health Act of 1970:

> "despite repeated warning over the years from other countries that their cotton workers suffered from lung disease, it is only within the past decade that we have recognized byssinosis as a distinct occupational disease among workers in American cotton mills." S. REP. No. 91-1282, 91st Cong., 2d Sess. 3 (1971), *reprinted in* LEGIS. HIST. 143.

[27] 29 U.S.C. § 671 (1976), establishes NIOSH within the Department of Health, Education, and Welfare as a national institute to "develop . . . recommended occupational safety and health standards." NIOSH's director is authorized, on his own initiative or at the request of the Secretary of Labor or the Secretary of Health, Education, and Welfare,

> to conduct such research and experimental programs as he determines are necessary for the development of criteria for new and improved occupational safety and health standards[.]

29 U.S.C. § 671(d)(1).

[28] Criteria Document: Recommendations for an Occupational Exposure Standard for Cotton Dust, J.A. 1-169.

that cotton dust exposure be "controlled to the lowest feasible limit which shall be less than 0.2 mg lint-free cotton dust/cu.m.," [29] or 200 $\mu g/m^3$.

Shortly thereafter, OSHA published an Advanced Notice of Proposed Rulemaking on cotton dust. OSHA requested interested parties to submit their views on the NIOSH recommendations and related issues concerning a proposed standard.[30] OSHA received comments from scientists, labor unions, industries, cotton growers, and governmental representatives. A proposed revision, published on December 28, 1976, called for an exposure limit of 200 $\mu g/m^3$ of cotton dust.[31] OSHA provided 90 days for interested parties to submit written comments.[32]

At the close of the comment period, OSHA conducted hearings in three cities for a total of 14 days.[33] The comments and exhibits received before the hearings, the written and oral testimony of the hearing participants, and post-hearing comments and briefs comprise the informal rulemaking record for the final cotton dust standard promulgated by the agency. This record exceeds 105,000 pages in length; it includes comments from 263 parties and testimony from 109 participants at the hear-

---

[29] J.A. 1974. *See also* 41 Fed. Reg. 565000 (1976).

[30] 39 Fed. Reg. 44769 (1974). The Advance Notice requested interested parties to submit written data, views, and arguments concerning "whether a new standard . . . should be issued on the basis of the [NIOSH] criteria or any other information" and on the contents of a proposed standard. *Id.*

[31] 41 Fed. Reg. 56498 (1967), J.A. 171.

[32] *Id.* at 56515, J.A. at 188.

[33] The hearing was conducted in Washington, D.C. on April 5-8, May 2-6, and May 16-17; in Greenville, Mississippi, on April 12; and in Lubbock, Texas, on May 10-12, 1977.

ing. The Final Standard and its accompanying statement of reasons fill 68 pages of the Federal Register.[34]

C. *The OSHA Standard*

On the basis of the massive rulemaking record, OSHA promulgated the cotton standard in an effort to reduce the health risks to cotton workers.[35] Part of the standard sets "permissible exposure limits" (PELs) for each manufacturing operation and industry that exposes workers to cotton dust.[36] Thus, OSHA set (1) 200 micrograms

---

[34] 43 Fed. Reg. 27350 (1978) (to be codified as 29 C.F.R. § 1910.1043(b)).

[35] *See* 43 Fed. Reg. 27394-418 (1978) (to be codified at 29 C.F.R. § 1910.1043). This is the first standard promulgated under § 6(b)(5) of the Act that does not involve a suspected carcinogen. Earlier standards were adopted for coke oven emissions, such as asbestos dust, *see* 29 C.F.R. § 1910.93a (1978).

Section 3(8) of the Act, 29 U.S.C. § 652(8) defines the term "occupational safety and health standard" to mean

> a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

The Act requires employers to "comply with occupational safety and health standards promulgated" under the Act, 29 U.S.C. § 654(a)(2), in addition to their general duty to furnish employment and a place of employment "free from recognized hazards that are causing or are likely to cause death or serious physical harm . . . ." 29 U.S.C. § 654(a)(1).

[36] The proposed and final standards both set limits for exposure to cotton dust particles that are both lint-free and small enough to be breathed. These respirable particles can be measured in microns over a given time period. Relying on what it found to be "the most persuasive testimony" in the record, OSHA used a 15-micron cut-off point to separate

er cubic meter (200 $\mu g/m^3$) as the PEL for lint-free respirable cotton dust in yarn manufacturing; (2) 750 $\mu g/m^3$ for slashing and weaving operations in the cotton industry; and (3) 500 $\mu g/m^3$ for all other processes in the cotton industry and for all non-textile industries that expose workers to cotton dust.[37]

Implementation of the standard depends primarily on the adoption of engineering and work practice controls by employers. OSHA established a four-year implementation period during which employers are expected to achieve compliance. If an employer establishes that the required controls are infeasible, he can obtain an administrative variance from the standard,[38] but he must make respirators available to protect his employees until he achieves compliance.[39] The standard also requires em-

---

respirable from non-respirable particles. 43 Fed. Reg. 27355 (1978). Once this cut-off size was determined, the rulemaking participants agreed that the verticle elutriator, a machine that screens airborne particles, is the best sampling device currently available. It separates particles larger than 15 microns from the remaining, "respirable" portion of dust. *Id.* at 27382-84. The verticle elutriator cotton sampling device eliminated from the sample all non-respirable particles, including cotton fly and lint fibers. *See* J.A. 129. In its final standard, OSHA designated the verticle elutriator "or a method of equivelent accuracy and precision" as the means for measuring dust levels, averaged over an eight-hour period. 43 Fed. Reg. 27395 (1978) (to be codified at 29 C.F.R. § 1910.43(c)). Also specified that the measuring devices "should operate at a flow rate of 7.4±0.2. liters per minute. *Id.* at 27398 (sampling equipment).

[37] *Id.* at 27395 (to be codified at 29 C.F.R. § 1910.1043(c)).

[38] *See* 43 Fed. Reg. 27395 (1978) (§ 1910.1043(e) of the standard); 29 U.S.C. §§ 655(b)(6)(A) (1976) (variance procedures). *See* text at note 235 *infra*.

[39] 43 Fed. Reg. 27396 (1978) (§ 1910.1043(f) of the standard); *id.* at 27386.

ployers to monitor employees' exposure to cotton dust, to provide medical surveillance and employee education, and to post warning signs about the health risks.

Before examining petitioners' objections, we consider the limits of our review.

II. Scope of Review

The Occupational Safety and Health Act of 1970 is one of a number of recent Congressional statutes that designates the stringent "substantial evidence" test for judicial review of notice-and-comment rulemaking.[40] The explicit language of the Act,[41] its legislative history,[42] and its application by the courts[43] confirm that regula-

---

[40] *See* Federal Trade Commission Improvement Act of 1974, 15 U.S.C. § 57a(4)(3)(A) (1976); Consumer Product Safety Act, 15 U.S.C. § 2060(c) (1976); Toxic Substances Control Act, 15 U.S.C. § 2618(C)(1)(B)(i) (1976).

[41] The OSH Act, § 6(b)(5), 29 U.S.C. § 655(f) (1976), assigns the scope of review for any challenge to a standard issued under § 6 of the Act, 29 U.S.C. § 655:

> The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

[42] H. Rep. No. 91-1765, 91st Cong., 2d Sess. 36 (1970) (Statement of the Managers on the Part of the House), *reprinted in* Legis. History at 1189. *See* Assoc. Indus. v. Dep't of Labor, 487 F.2d 342, 348-49 (2d Cir. 1973) (Friendly, J.) (discussing legislative history).

[43] In Industrial Union Dep't v. Hodgson, 499 F.2d 467 (D.C. Cir. 1974), this court rejected the claim that the substantial evidence test adopted in the Act should apply only to factual determinations. This view would leave policy judgments behind a challenged health and safety standard reviewable only under the arbitrary and capricious test. 499 F.2d at 473. Instead, this court concluded that under the Act, policy inferences along with factual determinations must not escape "exacting scrutiny" even though inferences cannot be strictly verified. *Id.* at 475. *See also* Assoc. Indus. v. Dep't of Labor, 487 F.2d 342, 349 (2d Cir. 1973).

tions promulgated under the Act are to be upheld on review if supported by "substantial evidence on the record considered as a whole." [44]

The substantial evidence test provides for more rigorous scrutiny than the usual "arbitrary and capricious" [45] test applicable to informal rulemaking.[46] Although Congress required this more rigorous judicial review, it nevertheless delegated unusually broad discretionary au-

---

[44] 29 U.S.C. § 655(f) (1976). The requirement of substantial evidence "on the record considered as a whole" means that reviewing courts must take into account not just evidence that supports the agency's decision, but also countervailing evidence. Universal Camera Corp. v. NLRB, 340 U.S. 474, 481-82 (1951). Yet this requirement does not alter the court's fundamental duty to uphold the agency's "choice between two fairly conflicting views, even though the court would justifiably have made a different choice had the matter been before it *de novo*." *Id.* at 488.

[45] See Administrative Procedure Act, 5 U.S.C. § 706(2)(A) (1976). Until the last decade, this was the standard of review typically applied to informal rulemaking. *See* K. DAVIS, 1 ADMINISTRATIVE LAW TREATISE § 6.6 (1978). It remains as a basic standard of review, along with other criteria of legality and constitutionality, even when the substantial evidence test applies. *E.g.*, May Trucking Co. v. United States and ICC, 593 F.2d 1349, 1352 (D.C. Cir. 1979).

[46] In application, however, the lines between the two tests are far from clear. In Citizens to Preserve Overton Park, 401 U.S. 402, 415-16 (1971), the Supreme Court held that review of informal agency action must be "thorough, probing, in-depth" and "searching and careful"—even where the substantial evidence test does not apply. This court concluded in Greater Boston Telephone Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir. 1970), that even in reviewing agency adjudication, the essential requirement is reasoned decision making. *See generally* Assoc. Indus. v. Dep't of Labor, 487 F.2d 341, 349-50 (2d Cir. 1973) (convergence between "substantial evidence" and "arbitrary or capricious" criteria).

thority to regulate against possible harms.[47] We have already resolved this seeming anomaly in *Industrial Union Dep't v. Hodgson*, 499 F.2d 467 (D.C. Cir. 1974). There we concluded that the reviewing court's task under the Act is to provide a careful check on the agency's determinations without substituting its judgment for that of the agency.[48] Congress apparently created an "uneasy partnership" between the agency and the reviewing court[49] to check extravagant exercises of the agency's authority

---

[47] The substantial evidence test was adopted in the Act apparently as a compromise when the House relinquished its advocacy of formal agency proceedings and adopted the Senate's informal rulemaking provision. *See* H. REP. No. 91-1765. 91st Cong., 2d Sess. 36 (1970), *reprinted in* LEGIS. HIST. at 1189. *See also* Industrial Union Dep't v. Hodgson, 499 F.2d at 473; Assoc. Indus. v. Dep't of Labor, 487 F.2d at 348-49 (discussing legislative history of scope of review provision).

[48] In *Industrial Union Dep't v. Hodgson*, this court construed the substantial evidence review in terms of the demands to be made by the reviewing court:

> What we are entitled to at all events is a careful identification by the Secretary, when his proposed standards are challenged, of the reasons why he chooses to follow one course rather than another. Where that choice purports to be based on the existence of certain determinable facts, the Secretary must, in form as well as substance, find those facts from evidence in the record. By the same token, when the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found persuasive.

499 F.2d at 475-76.

[49] Assoc. Indus. v. Dep't of Labor at 354. This partnership is uncomfortable for the courts chiefly because the record produced by informal rulemaking is not easily suited to close judicial scrutiny. *See* Florida Growers Ass'n v. Dep't of Labor, 489 F.2d 120, 129 (5th Cir. 1974). The record generally is a compendium of letters, studies, reports, and statements, untested by the adversary process. Reflecting the

to regulate risk.[50] Our role in this partnership is to ensure that the regulations resulted from a process of reasoned decisionmaking consistent with the agency's mandate from Congress.[51] By statute, this process must include notice to interested parties of issues presented in the proposed rule.[52] The agency must also provide opportunities for these parties to offer contrary evidence and arguments.[53]

OSHA adopted additional procedures to improve its decisionmaking process.[54] A qualified hearing examiner

---

legislative nature of informal rulemaking, the record often does not even display the full range of considerations before the agency when the decision was made. Pedersen, *Formal Records and Informal Rulemaking*, 85 YALE L.J. 38, 62 (1975). Furthermore, the decision necessarily rests on policy considerations authorized by the agency's mandate. Judicial review of such considerations cannot be identical to review of factual determinations.

[50] Congress wanted the Secretary to protect workers not only against known harms, but also against risks of harms not entirely understood. *See, e.g.*, S. REP. No. 91-1282, 91st Cong., 2d Sess. 4 (1970), *reprinted in* LEGIS. HIST. at 144 (discussing need to regulate organophosphates and chlorinated hydrocarbons).

[51] Universal Camera v. NLRB, *supra* at 488; Ethyl Corp. v. EPA, 541 F.2d 1, 34 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976).

[52] 29 U.S.C. §§ 655(b) (2), (3) (1976).

[53] *Id.*

[54] The OSH Act requires the Secretary to follow these procedures in promulgating health and safety standards under § 655 of the Act:

1) publication of the proposed rule in the Federal Register, § 655(b) (2);

[Continued]

must preside at oral hearings on proposed standards. A verbatim transcript of the hearing is required, and cross-examination is permitted. These procedures, which were followed in this case, transform OSHA's action into "hybrid" rulemaking,[55] and produce a record more susceptible to rigorous judicial review than the more usual informal rulemaking record.[56]

---

[54] [Continued]

2) opportunity for interested parties to submit "written data or comments" within thirty days after publication of the proposed rule, § 655(b)(2);

3) opportunity for interested parties to submit "written objections to the proposed rule . . . and request[] a public hearing on such objections," § 655(b)(3);

4) publication in the Federal Register of time and place for hearing scheduled on objections to proposed standard, § 655(b)(3); and

5) promulgation of final rule, or decision not to issue one, within sixty days after period permitted for written comments, or within sixty days after completion of hearing, § 655(b)(4).

These provisions add to the minimal procedures required by the APA, 5 U.S.C. § 553 (1976).

The agency also requires that all relevant information, including submissions and testimony, must be considered in formulating the final standard. 29 C.F.R. § 1911.18(a)(1) (1978). The statement of basis and purpose for the final standard must describe "the significant issues which have been faced, and . . . the rationale for their solution." 29 C.F.R. § 1911.18(b) (1978).

[55] *See* K. DAVIS, 1 ADMINISTRATIVE LAW TREATISE, 453 (1978).

[56] In describing the additional procedures, the agency noted a congressional expectation that the rulemaking would be on the basis of a record "to which a substantial evidence test, where pertinent, may be applied." 29 C.F.R. § 1911.15(a) (1978).

The tasks of this reviewing court are thus to ensure that the agency has (1) acted within the scope of its authority;[57] (2) followed the procedures required by statute and by its own regulations;[58] (3) explicated the bases for its decision; (4) adduced substantial evidence in the record to support its determinations.[59]

The meaning of "substantial evidence" in this context is problematic. Factual proof about particular health risks may not be substantial in the traditional sense simply because the medical and scientific communities do not yet completely understand the nature of threatening diseases. To protect workers from material health impairments, OSHA must rely on predictions of possible future events and extrapolations from limited data. It may have to fill gaps in knowledge with policy considerations. Congress recognized this problem by authorizing the agency to promulgate rules on the basis of the "best available evidence."[60] OSHA's mandate necessarily requires it to act—even if information is incomplete—

---

[57] Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 415 (1971); City of Chicago v. FPC, 458 F.2d 731, 745 (D.C. Cir. 1971); Automotive Parts & Accessories Ass'n v. Boyd, 407 F.2d 330, 343 (D.C. Cir. 1968); 5 U.S.C. § 706(a)(C) (1976).

[58] Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 417 (1971); Friends of the Earth v. United States Atomic Energy Comm'n, 485 F.2d 1031, 1033 (D.C. Cir. 1973); 5 U.S.C. § 706(2)(D) (1976).

[59] *See* note 40 *supra*. We have also described these three elements as review of (1) the agency's interpretation of its authorizing statute; (2) procedural integrity; and (3) the substantive basis for the agency's decision. Weyerhaeuser Co. v. Costle, 590 F.2d 1011, 1024-28 (D.C. Cir. 1978).

[60] 29 U.S.C. § 655(b)(5) (1976). The best available evidence in an area of changing technology and incomplete scientific data may leave gaps in knowledge that require policy judgments in constructing the health and safety standard. In

when the best available evidence indicates a serious threat to the health of workers.[61] Thus, a court entrusted with the rigorous "substantial evidence" review must examine not only OSHA's factual support, but also the "judgment calls" and reasoning that contribute to its final decision.[62] Otherwise, an agency's claim of ignorance would clothe it with unreviewable discretion.

Therefore, the reviewing court must examine both factual evidence and the agency's policy considerations set forth in the record. To facilitate this review of the record, the agency must pinpoint the factual evidence and the policy considerations upon which it relied.[63]. This requires explication of the assumptions underlying predictions or extrapolations,[64] and of the basis for its

---

recent statutes Congress has defined "evidence" to mean "any matter in the rulemaking record." *E.g.*, Toxic Substances Control Act, 15 U.S.C. § 2618(c)(1)(B) (1976).

[61] 29 U.S.C. § 655(b)(5) (1976). A suit was filed in 1975 charging unlawful delay in modification of the then-existing standard. Amalgamated Clothing & Textile Workers Union, et al. v. Secretary of Labor, No. 75-2157 (D.C., filed Dec. 24, 1975).

[62] 499 F.2d at 475; 487 F.2d at 348.

[63] *See* SEC v. Chenery Corp., 318 U.S. 80, 87 (1943).

[64] With regard to environmental rulemaking, this court held that

> Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, the regulations designed to protect the public health, and the decision that of an expert administrator, we will not demand rigorous step-by-step proof of cause and effect. Such proof may be impossible to obtain if the precautionary purpose of the statute is to be served. . . . The Administrator may apply his expertise to draw conclusion from suspected, but not completely substantiated, relationships

esolution of conflicts and ambiguities.[65] In enforcing hese requirements, the court does not reach out to resolve controversies over technical data.[66] Instead, it seeks to ensure public accountability. Explicit explanation for the basis of the agency's decision not only facilitates proper judicial review but also provides the opportunity for effective peer review, legislative oversight, and public

---

> between facts, from trends among facts, from probative preliminary data not yet certifiable as 'fact,' and the like.

Ethyl Corp. v. EPA, 541 F.2d 1, 28 (D.C. Cir. 1976) (citations omitted). *See* Amoco Oil Co. v. EPA, 501 F.2d 722, 740-41 (D.C. Cir. 1974) (reasons and explanations, but not findings, required for predictions used in risk regulation).

[65] [W]hen the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found persuasive.

499 F.2d at 476.

[66] *See* Ethyl Corp. v. EPA, 541 F.2d 1, 67 (D.C. Cir. 1976) (Bazelon, C.J., and McGowan, J., concurring); Internat'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 652 (D.C. Cir. 1973) (Bazelon, C.J., concurring in result). From their stance outside of both scientific and political debates, courts can help to ensure that decisionmakers articulate the basis for their decisions. But once courts step beyond that role and endeavor to judge the merits of competing expert views, they leave the terrain they know. In so doing, the judiciary may mislead the public into believing it provides an expert check on decisions that in fact it does not fully comprehend.

Thus, a court applying the substantial evidence test to a numerical standard considers "whether the agency's numbers are within a 'zone of reasonableness,' not whether its numbers are precisely right." Hercules, Inc. v. EPA, 598 F.2d 91, 107 (D.C. Cir. 1978). Similarly, the possibility of drawing two inconsistent conclusions from the evidence does not prevent an administrative agency's finding from being supported by substantial evidence. Environmental Defense Fund v. EPA, 510 F.2d 1292, 1298 (D.C. Cir. 1975); *accord* Bayside Enterprises, Inc. v. NLRB, 429 U.S. 248, 302 (1976).

education. This requirement is in the best interest of everyone, including the decisionmakers themselves. If the decisionmaking process is open and candid, it will inspire more confidence in those who are affected. Further, by opening the process to public scrutiny and criticism, we reduce the risk that important information will be overlooked or ignored. Instructed by these ends, this court on review will "combine supervision with restraint." [67]

III. Challenges By the Textile Industry

The textile industry petitioners acknowledge that textile workers who are exposed to cotton dust may risk contracting byssinosis.[68] Their challenge focuses on the regulatory approach OSHA has chosen to reduce that risk. Specifically, they ask us to find that OSHA's regulatory approach is not "reasonably necessary" to protect textile workers from the admitted danger posed by cotton dust.[69] Further, they ask us to find that approach technologically and economically infeasible.[70]

A. *Challenge to the Regulatory Approach*

OSHA chose a "dust control strategy" that requires engineering and work practice controls to limit worker exposure to the "lowest feasible [cotton] dust levels" within four years.[71]

---

[67] Public Serv. Comm'n v. FPC, 511 F.2d 338, 355 (D.C. Cir. 1975).

[68] *See, e.g.*, Joint Brief Textile Petitioners at 2-3; 8-9 [hereinafter cited as Textile Brief] ("[t]he development of byssinosis has been associated with the inhalation of an unknown element in the dust generated by the handling or processing of cotton"); *id.* at 18 (referring to "the slowly progressive health hazard presented by exposure to 'cototon dust' ").

[69] Textile Brief at 54-65.

[70] *Id.* at 18-20, 29-34, 37-54.

[71] *See* text at notes 37-39.

The textile industry rejects OSHA's approach as unnecessarily expensive. The industry contends that workers can be fully protected from "'*material impairment* of [their] health or functional capacity'" by a higher permissible exposure level coupled with a medical surveillance program.[72] The industry's alternative would permit an exposure level of 500 $\mu g/m^3$ in all cotton manufacturing operations except weaving, for which a PEL of 1000 $\mu g/m^3$ is proposed. This alternative would also require workers to wear respirators or accept transfers to lower exposure work areas if medical surveillance shows that they are suffering from byssinosis symptoms "which, with years of continued exposure, could lead to [material health] impairment."[73]

The textile industry petitioners claim that OSHA failed to seriously consider their alternative or to provide adequate reasons for rejecting it. The industry also claims that the regulatory approach adopted by OSHA is not permitted by the Act.[74] We disagree with both claims.

First, OSHA gave serious attention to the medical studies conducted by the textile industry and proffered to support the industry's alternative.[75] These studies pur-

---

[72] *Id.* at 57 (emphasis in original); *id.* at 21.

[73] *Id.* at 21-22. The industry claims that its approach will provide protection comparable to OSHA's strategy in that neither completely eliminates the occurance of early byssinosis symptoms. *Id.* at 16-17.

[74] *Id.* at 54-64.

[75] The industry relies on the following studies: (1) Burlington Industries, Inc., study of 12,519 workers from 1970-1976 (Joint Appendix (J.A.) 2035; (2) West Point-Pepperell, Inc. study of 9,181 workers in 1973 (J.A. 1987, 2005); (3) study by Dr. W.K.C. Morgan of 720 workers (J.A. 2008); (4) study by Dr. Hans Weill, an OSHA witness, with complete data on 418 workers (J.A. 1235, 1240); (5) study by Cone Mills Corporation of 6,631 workers (J.A. 2012). These studies are discussed at length in OSHA's statement of reasons. *See* 43 Fed. Reg. 27355-57 (1978).

port to show that medical surveillance programs at various textile plants have already afforded workers a level of protection comparable to that offered by OSHA's approach. The record shows that OSHA specifically addressed and scrutinized these studies, and concluded that their validity had largely been discredited.[76] OSHA's judgment on

---

[76] *See generally*, 43 Fed. Reg. 27355-57. OSHA found the industry studies deficient on many grounds. First, the prevalence of byssinosis reported at the studied mills tended to be low, but these mills had experienced dust reduction *prior to* implementation of medical surveillance. Consequently, the mills studies by the textile industry lacked a necessary precondition—a dust level of at least 500 $\mu g/m^3$—validly to test the industry's contention that their proposal would be as effective as OSHA's lower PELs in reducing the prevalence of byssinosis.

OSHA also identified substantial, unexplained differences between the percentage of workers who reported subjective byssinosis symptoms and the percentage of those showing pulmonary function decrements indicative of the disease. The textile industry refers to workers' subjective health reports but not to the objective, pulmonary function measurements. The Union petitioners note that workers sometimes falsely deny byssinosis symptoms for fear of losing their jobs if their employer learns that their health is impaired. AFL-CIO, American Textile Manufacturers Institute, Inc., *et al.*, Petitioners Reply Brief and Brief in Intervention at 42 n.55 [hereinafter Union Reply Brief].

OSHA also criticized the industry studies on a number of other grounds. 43 Fed. Reg. 27356-57. First, none of the studies had been subjected to peer review through publication in scientific journals. None of them produced dose-response data, that is, data charting medical responses to different dust levels. The populations studied may not be representative of the entire affected population. Finally, the validity of the studies could not be verified because the textile industry declined to furnish the underlying data, and in some cases, failed to produce the authors of the studies for cross-examination at the hearing. Consequently, OSHA concluded that these studies provided insufficient basis for the regulation.

this issue is sufficiently supported on this basis.[77]

Besides this careful treatment of the medical surveillance proposal, OSHA rejected the industry's proposed reliance on job transfers and respirators to protect workers suffering from acute symptoms of byssinosis on the basis of testimony in the record and express policy considerations.[78] The industry was unable to show that job transfers would be available in sufficient number to respond to the likely prevalence of byssinosis in plants with dust levels at the 500 $\mu g/m^3$ proposed by the industry.[79] Further, the agency found uncontradicted testimony in the record that respirators can cause severe physical discomfort and create safety problems of their own.[80] OSHA concluded that the industry's proposal in-

---

[77] Our task is not to resolve the controversy over the studies, but to determine if the agency received and fairly responded to challenges. It did so here in its consideration of the industry's studies. Its explicit identification of flaws in the studies can, *inter alia*, alert future participants to the quality of research it seeks as a basis for its regulations.

[78] 43 Fed. Reg. 27384 (1978).

[79] OSHA, relying on dose-response data submitted by Dr. Merchant, found that 25% of the workers exposed to a 500 $\mu g/m^3$ PEL would develop byssinosis. At this prevalence rate, it is doubtful that all of the affected workers could be moved to a low exposure area. *See, e.g.*, Testimony of Dr. Imbus, Medical Director, Burlington Industries (J.A. 3379-80) noting that 10% was the maximum number of workers who could be reassigned through a medical surveillance and job transfer approach).

[80] OSHA carefully explained why it rejected "a control strategy involving principal reliance on respiratory protection[] to reduce the cost of compliance":

> [R]espirators have many disadvantages which preclude primary reliance or co-reliance on respiratory protection on an equal basis with engineering and work practice controls. The many difficulties . . . were enumerated at

appropriately placed the burden of compliance on the employees.[81] On this express policy ground, and on the basis of the evidence in the record, OSHA reasonably rejected these elements in the industry alternative.

Finally, the textile industry argues that the agency's effort to reduce workers' cotton dust exposure to the lowest feasible level is not "reasonably necessary or appropriate." [82] This argument rests on the claim that the agency need not guard against the acute but reversible symptoms of byssinosis because they do not themselves constitute a "material impairment of health." [83] We find

---

> the hearing . . . because of difficulties in face fit, it is difficult to know whether the respirator actually provides adequate protection; respirators, by interfering with vision, hearing, and mobility, can cause safety problems; some employees cannot wear respirators because of breathing difficulties.

43 Fed. Reg. 27384 (1978).

[81] *Id.* ("it is not appropriate to place the burden of compliance principally on the employee, as would be the case if respiratory protection were the principal means of reducing employee exposure.").

[82] Textile Brief at 21, 55. "Reasonably necessary or appropriate" is language from the statutory definition of an "occupational safety and health standard." *See* § 652(8) (defining "occupational safety and health standard" as requiring conditions or practices "reasonably necessary or appropriate to provide safe or healthful employment and places of employment"). Apparently, the thrust of the textile industry's argument on this point is not that OSHA lacks the power to promulgate a standard that reduces worker exposure to the lowest feasible levels. Rather, the industry argues that OSHA inadequately explained why "it chose to apply its full range of powers" instead of accepting the industry's less stringent alternative. *Id.* at 63-64.

[83] *See id.* at 57-59. The Act does not itself define "material impairment." Although testimony at the rulemaking hearing described the acute symptoms of byssinosis as "a serious health

that this claim and its attendant argument must fall in the face of the agency's evidence and reasons.

The agency adopted a "dust control strategy" after finding conclusive evidence of a causal relation between exposure to cotton dust and the contraction of respiratory diseases, such as byssinosis. The agency acknowledged gaps in medical understanding of the specific causal relationship between cotton dust and disease.[84] Nonetheless, the agency's mandate requires it to protect workers' health even before the resolution of all medical and scientific uncertainties about the particular health risk.[85] Further, OSHA heard several witnesses conclude that at present," there is no basis for any programs of prevention and control of byssinosis other than those based on prevention of exposure to respirable cotton dust." [86] Virtually without exception, key textile industry witnesses along with public health experts rejected medical surveillance as an alternative to dust reduction.[87] Accordingly,

---

hazard," Hearing Transcript at 168 (testimony of Dr. Bouhuys), we do not here need to decide whether these symptoms constitute "material impairment" for the purposes of the Act. Instead, we find adequate support in the record for the agency's choice of the dust control strategy effectively to protect workers from byssinosis, which is conceded by all to cause material impairment in its chronic stage.

[84] *See* note 16 *supra.*

[85] *See* H. Rep. 91-1291, 91st Cong., 2d Sess. at 18 (1970), *reprinted in* LEGIS. HIST. at 848 (OSHA not to "be paralyzed by debate surrounding diverse medical opinion"). *See also* Soc'y of Plastics v. OSHA, 509 F.2d 1301, 1308 (2d Cir. 1975), *cert. denied*, 421 U.S. 992 (1975).

[86] 43 Fed. Reg. 27355 (1978).

[87] The textile industry's leading witness, Dr. Imbus of Burlington Industries, acknowledged that "[m]edical surveillance programs are not a substitute for diligent efforts to control dust." J.A. 396.

[Continued]

the agency adduced considerable evidence to support its dust control strategy.

The agency's approach, which is similar to its strategy in regulating asbestos,[88] is authorized by the primary purpose and by the special mandate of the Act. Section 2(b) sets out the Act's broad protective purpose: "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions." Toward this end, section 6(b)(5) authorizes OSHA to set permanent standards for occupational exposure to "toxic materials or harmful physical agents" at the level

> which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.[89]

Contrary to the industry's view, this mandate does not restrain the agency from acting to prevent irreversible health damage until workers actually suffer the early symptoms of byssinosis. Instead it is a mandate to reduce

---

[87] [Continued]

The need for a dust control strategy was a constant theme of expert testimony. Drs. Merchant and Bouhuys, for example, both recommended PELs well below the 500 $\mu g/m^3$ level proposed by the textile industry. At the hearing, Dr. Bouhuys and NIOSH recommended a 200 $\mu g/m^3$ PEL. J.A. 1233, 1448. Dr. Merchant recommended a PEL of 100 $\mu g/m^3$. J.A. 369. Even Dr. Weill, who appeared on behalf of the textile industry, declined to endorse the industry's proposed PEL. Instead he recommended that the PEL be set somewhere between 200 $\mu g/m^3$ and 500 $\mu g/m^3$. J.A. 1237.

[88] *See* 29 C.F.R. 1910.93a (1978); Industrial Union Dep't v. Hodgson, 499 F.2d 467, 478-81 (D.C. Cir. 1974) (discussing asbestos standard).

[89] 29 U.S.C. § 655(b)(5) (1976).

the risk of that irreversible damage—especially for those workers who have regular exposure to the causal agent, cotton dust. In the present case, OSHA adequately documented the risk of such damage attributable to continued exposure to cotton dust. Medical experts testified on the record that the early, acute symptoms of byssinosis weaken the worker's pulmonary system and increase his susceptibility to the adverse effects of subsequent cotton dust exposure.[90] We therefore uphold OSHA's decision to reduce the prevalence of chronic byssinosis through regulations stringent enough to reduce even the occurence of the reversible acute stage of the disease.

B. *Feasibility of the Standard*

All parties acknowledge that OSHA must evaluate technological and economic feasibility in setting permanent standards under section 6(b)(5) of the Act. These considerations set constraints on the agency's mandate to assure employees "the highest degree of health and safety."[91] In light of petitioners' claims, we must examine the record to ensure that OSHA has not exceeded its mandate by neglecting these constraints.

We are assisted here by this court's interpretation of the feasibility requirement in *Industrial Union Dep't, AFL-CIO v. Hodgson.* In that case, we concluded that

---

[90] *E.g.*, J.A. 1218.

[91] § 6(b)(5); 29 U.S.C. § 655(b)(5) (1975). The Secretary is to promulgate a health and safety standard "which most adequately assures, *to the extent feasible*, on the best available evidence, that no employee will suffer material impairment or health or function capacity. . . . In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, *the feasibility of* the standards, and experience gained under this and other health and safety laws." (emphasis added).

the feasibility requirement reflects Congress' recognition that employees would not be protected if their employers were put out of business.[92] This possibility is all too real if the agency inflexibility requires protective devices unavailable under existing technology or otherwise makes financial viability impossible.[93] At the same time, we concluded, standards do not become infeasible simply because they may impose substantial costs on an industry, force the development of new technology, or even force some employers out of business.[94] Otherwise the Act's commitment to protect workers might be forever frustrated.

In this case, the textile industry petitioners contend that the record does not support OSHA's findings of technological and economic feasibility. First, they argue that the standard is technologically infeasible for the spinning through weaving stages of textile manufacturing.[95] Further, they argue that the record does not sup-

---

[92] 499 F.2d 467, 477-78 (D.C. Cir. 1974).

[93] *Id.*

[94] "It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers." *Id.* at 478.

[95] Textile Brief at 20, 28-34. According to the industry, the production of fabric from cotton involves twelve distinct manufacturing operations, falling into three general stages. *Id.* at 7.

During the first stage, raw cotton is cleaned and prepared for spinning into yarn. This first stage involves opening, picking, carding, drawing, and roving the cotton. The second stage transforms the prepared cotton into yarn and packages it for subsequent processing. The principal operation in this stage is spinning, during which the prepared cotton slivers are elongated. The next operations in this stage consolidate units of spun yarn and prepares them for weaving by twisting, winding, spooling, and warping. The third stage of oper-

port the agency's finding that the standard is economically feasible. In addition, they argue that "OSHA failed to satisfy its obligation seriously to weigh even its grossly understated costs against the benefits sought to be secured by the Standard." [96]

Our review of these challenges is not designed to resolve the technical and economic debates. Our duty is simply to determine from close scrutiny of the entire record whether the feasibility of the standard is adequately supported by data and policy considerations. In addition, the agency must have considered and responded to serious challenges to the claim of feasibility. On both counts, we find that OSHA has performed its task adequately.

1. *Technological feasibility*

The textile industry does not argue that the exposure level set for the intial stages of textile manufacturing is technologically infeasible.[97] Its attack is limited to the feasibility of the level set for the later stages of spinning through weaving,[98] and to the four-year deadline for

---

ations involves slashing and weaving. Slashing adds sizing to the yarn; weaving then interlaces two sets of yarn to produce a woven fabric. Under the cotton dust standard, the first two stages are classified together as "yarn manufacturing." *Id.* at 7-8.

[96] *Id.* at 21. The Unions also challenge the standard under the feasibility requirement, but unlike the textile industry petitioners, they argue that the exposure level set by the agency is not the lowest one feasible. We consider this challenge in note 150 *infra*.

[97] *Id.* at 25 ("general principles of dust control . . . are expected generally to yield compliance in the operations from *opening through roving*" stage.

[98] *Id.* at 24-35 (challenging technological feasibility of 200 $\mu g/m^3$ set for spinning through warping and 750 $\mu g/m^3$ set for slashing and weaving).

compliance.[99]

Judging the technological feasibility of a particular agency goal is beyond the expertise of the judiciary especially where the assessment involves predictions of technological changes.

Instead, our task on review is to find whether the agency sufficiently supported its feasibility determination with material in the record. Here, the agency's position is supported with evidence that existing dust control techniques can bring about compliance in the textile industry.[100]

First, OSHA points to evidence in the record that many employers already are in compliance with the 200 $\mu g/m^3$ PEL set for spinning through warping operations. This finding at least in part refutes the industry's charge that on technological grounds it cannot meet the required exposed level for these operations. Notably, three-fourths of the spinning operations described in the industry's own study had dust levels below the 200 $\mu g/m^3$ level and others were very close to voluntary compliance.[101]

The textile industry does not contend that the looms or frames not yet in compliance in any way differ from those already complying with the new PEL. Rather, the industry asserts that the noncomplying mills run dustier

---

[99] *Id.* at 34-37. *See* Part V *infra* for our consideration of this claim.

[100] These measures include improving general ventilation, and requiring better maintenance of equipment. OSHA also recommended more thorough cleaning of the cotton in the opening and cleaning processes, and better dust control in the opening through roving stages or isolation of these operations. *See* 43 Fed. Reg. 27363-65 (1978). *See also* J.A. 3607-08, 1145 (improving general ventilation); J.A. 80 (equipment maintenance); J.A. 1886 (cleaning of cotton); J.A. 2445 (dust control); and J.A. 551 (isolation of certain processes.

[101] *See, e.g.*, J.A. 3490-3560; 2008-2011. *See generally* 43 Fed. Reg. 27362-68 (1978).

cotton. This contention, as OSHA answers, is belied by the record, for the requisite PEL has been met in spinning operations running 100% coarse cotton, which is the dustiest variety.[102]

There is also evidence that some mills have achieved low dust levels in the twisting, winding, spooling, and warping operations.[103] OSHA admits that these operations have been studied less than spinning, apparently because these operations generate very little cotton dust.[104] The agency nevertheless obtained evidence that existing dust control principles can be adapted to these operations as the need arises.[105]

---

[102] J.A. 3532, 3538-40, 3544.

[103] J.A. 792-93, 1887; 43 Fed. Reg. 27367 (1978).

[104] *See* 43 Fed. Reg. at 27367 ("Levels in [winding, spooling, twisting, and warping] are currently very low and are not expected to present a compliance problem") (citations to the record omitted).

[105] *See, e.g.*, J.A. 2240-41. Thus OSHA acknowledged that the

> industry has had less experience with specific controls past roving. OSHA recognizes these difficulties and further recognizes that increased effort may be necessary in some instances to achieve compliance with the exposure limits prescribed for the textile operations. Yet, the evidence in the record demonstrates the feasibility of adopting dust control principles, proven successful in other operations, to new stages of the process.

32 Fed. Reg. 27362 (1978). The agency also concluded generally that "inherent operational difficulties found in some operations may require increased effort to reduce dust levels to 200 $\mu g/m^3$; however, OSHA agrees with RTI's assessments and concludes that the vast majority of workplaces will be able to comply with little difficulty." *Id.* at 27367. ("RTI" is the Research Triangle Institute which completed the "Technological Feasibility Assessment and Final Inflationary Impact Statement" for OSHA. J.A. 457

Similarly, the PEL set for slashing and weaving operations apears reasonable in light of the record. The industry's own chief witness estimated that 72% of the weaving operations met the requirement of 750 $\mu g/m^3$ when studied.[106] OSHA also cited a study in the record that identified three basic approaches to permit compliance by the remaining mills in these operations: (1) isolating the weaving rooms; (2) separating room ventilation systems; and (3) installing local exhaust ventilation equipment.[107]

Thus, for each operation of textile manufacturing, the agency established evidence of present compliance and existing control measures capable of increasing compliance. The agency therefore concluded that a

> combination of specific control measures . . . the adoption and modification of general dust controls, and further utilization of technological developments . . . already underway, should achieve compliance for the textile industry.[108]

The industry objects that OSHA drew unwarranted generalizations from dust measurements at small numbers of plants[109] and from expert testimony on general

---

[106] Testimony of Hovan Hocutt, J.A. 3929-3920. Other evidence submitted by the industry suggests that compliance may be even more widespread for the weaving operations. Of 32 weaving operations studied, 28 were below 750 $\mu g/m^3$, and no reading was greater than 870 $\mu g/m^3$. J.A. 3490-3560. And these measurements were taken before recent improvements in dust control. *See* J.A. 3490-3560.

[107] 43 Fed. Reg. 27367 (1978) (summarizing Research Triangle Institute (RTI) Technological Feasibility Assessment and Final Inflationary Impact Statement, IV-14-16 (1976), J.A. 1, 550-552).

[108] 43 Fed. Reg. 27362.

[109] OSHA's brief merely cites several instances where dust levels in [the twisting, winding, spooling and warping]

principles of dust control.[110] We agree that OSHA might have improved the quality of the record with more extensive studies at different mills and over different periods of time.[111] Further study, however, would have added substantial additional cost and delay to an already costly and prolonged rulemaking proceeding.[112] Rather than directing the agency to wait for the best evidence, the OSH Act requires the agency to develop standards based upon "the best *available* evidence."[113] This court will not require further survey research from the agency especially where it has made an informed decision to rely

---

> operations are at or below 0.5 mg/m³ or 0.2 mg/m³. None of these references prove, or even suggest, that the required 0.2 mg/m³ either exists on a constant basis or is being achieved by the application of dust control equipment.

Textile Reply Br. at 8.

[110] Textile Br. at 29.

[111] It also would have been helpful to the court if OSHA had more fully delineated the methodological assumptions underlying some of the studies on which it relied. A more logical and systematic explanation of the inferences drawn from studies would have facilitated our review. Nonetheless, the agency did adequately explain the factual and policy considerations informing its judgments.

[112] The Unions and the North Carolina Public Interest Research Group filed suit in 1975 to prevent what they contended was unlawful delay in promulgation of the standard. Amalgamated Clothing & Textile Workers Union, et al. v. Secretary of Labor, No. 75-2157 (D.C.D.C.). The district court judge repeatedly admonished the government to promulgate the standard without improper delay. *See* Transcript of Proceedings on June 6, 1978. Secretary of Labor Marshall makes reference to this suit in his May 24, 1978 "Memorandum . . . to President Carter Urging Issuance of Cotton Dust Standard." 8 BNA Occupational Safety and Health Reporter 54-55 (June 8, 1978).

[113] Section 6(b)(5), 29 U.S.C. § 655(b)(5) (1976).

on other credible sources of information, such as the extensive expert testimony, written comment and briefs, and research studies used here.[114]

Indeed, other circuits have upheld permanent health standards supported by less extensive and persuasive evidence than that present here. Those courts have upheld similar OSHA standards that require compliance with PELs that had never before been attained,[115] or that had been reached only at the "newest, cleanest" plants.[116] Here, OSHA has shown that much of the textile industry already has demonstrated its ability to comply with the cotton dust standard. It also points to evidence in the record that little, if any, technological innovation will be necessary for compliance to be reached in the entire in-

---

[114] In its "Proposed Standards and Notice of Hearing," OSHA said that it

> recognizes that many of the matters considered in this proposal are controversial and that gaps exist in the available scientific evidence. OSHA believes, however, that in this case we are dealing with an agent or agents that are extremely harmful to man. The existence of unanswered questions cannot be permitted to delay the process of proposing a standard for protecting workers exposed to cotton dust, as tens of thousands of workers are believed to suffer from the effects of exposure. OSHA hopes that the public participation which is invited will help to fill whatever gaps exist.

41 Fed. Reg. 56508 (1976).

[115] Society of the Plastics Industry, Inc. v. OSHA, 509, F.2d 1301 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975).

[116] American Iron and Steel Inst. v. OSHA, 577 F.2d 825, 833, 834 (3d Cir. 1978), *petitions for cert. pending*, Nos. 78-918, 78-919 (upholding OSHA's standards for coke oven emissions on the basis of reductions in emission levels at some plants; concluding that the industry "could with some self-confidence and determination develop 'their own technological potentialities' and achieve a variety of improvements.").

dustry.[117] Thus, the agency's finding of technological feasibility here is even more persuasive than findings affirmed in other cases that require the creation of new technology.

In sum, the agency fairly considered and took account of objections to its assessment of technological feasibility for the textile industry.[118] The agency linked its determination to evidence and policy considerations in the record. We support its judgment.

2. *Economic Feasibility*

The petitioners concede that OSHA's estimate of $550 million in capital costs would be economically feasible for the textile industry, but they claim that OSHA's estimate grossly understates the actual costs the industry will incur if the standard goes into effect. To evaluate this claim, we must first consider the accuracy of OSHA's cost estimate and then review its feasibility determination.

---

[117] OSHA noted one instance in which technological innovation would assist compliance with the cotton dust standard. Conversion of mills from traditional "ring" spinning to "open end" spinning would reduce the dust exposure to workers, yet, as OSHA acknowledged, ring spinning is not yet practical for all textile mills. 43 Fed. Reg. 27367 (1978). The agency concluded that "present general principles of ventilation control coupled with proven and applied control strategies" would be sufficient to bring the spinning operations into compliance, and technological innovation would simply be encouraged. *Id.*

[118] OSHA stated that it found unpersuasive the testimony of the textile industry's chief expert witness, Hovan Hocutt. The agency observed that Hocutt's experience derived primarily from his knowledge of the opening through roving operations, while the standards governing the operations of spinning through weaving gave rise to the most serious challenges. Further, the agency concluded that Hocutt "seemed to view each process in isolation and completely and consistently ignored the possibilities of dust control [other than through local exhaust equipment.]" OSHA Br. at 106, n.84.

a. Accuracy of cost estimates

OSHA derived its cost estimates from two principal sources: the Research Triangle Institute (RTI) estimates for the entire textile process [119] and industry estimates for part of the textile process.[120] OSHA tried to account for the divergence between the estimates from these two sources by exploring the assumptions each employed.[121] After examination, the agency decided that both sets of estimates are overstatements, and chose to rely on what it regarded the best portions of each estimate.[122]

All parties agreed that the largest cost imposed by the standard is the capital cost of engineering controls. OSHA found the RTI capital cost figures to be overstated on several bases.[123] OSHA concluded that RTI inappro-

---

[119] Research Triangle Institute, Cotton Dust: Technological Feasibility Assessment and Final Inflationary Impact Statement VI- V-129 & Appendices B, C & D (1976) (prepared for OSHA) (reprinted at J.A. Vol I at 619-750, 801-995 & Appendices B, C & D)). *See also* "Technological Feasibility and Economic Impact of Regulations for Cotton Dust: Testimony to be Presented by The Research Triangle Institute at Public Hearing," (1977) (reprinted at J.A. Vol. II, 1320-80.

[120] *See* Statement of Hovan Hocutt, Senior Vice President of Engineering Pneumafil Corporation, J.A. Vol. II, 2228-47; Statement of Arthur Thomas, Senior Vice President, The Bahnson Company, J.A. Vol. II at 2248-57.

[121] *See* 43 Fed. Reg. 27370-27380.

[122] OSHA's estimate of total compliance costs for the textile industry is based on the industry estimates for capital costs and annualized costs, and the RTI estimates for costs of medical surveillance and other non-capital expenditures. 43 Fed. Reg. 27373 (1978); *id.* at 27380 (Table 3).

[123] OSHA also criticized the RTI estimates of annualized capital costs for failing to take account of the investment tax credit. *Id.* at 27371. The estimates also assumed a high interest rate, but OSHA found this an acceptable reflection of the industry's external financing situation. Thus, OSHA concluded that the RTI estimates of annualized capital costs were calculated on a "conservatively high basis." *Id.*

priately included estimates for plants processing blends between cotton and synthetics.[124] Further, OSHA found that RTI neglected the cost advantages available when compliance is achieved through moderizing rather than retrofitting the machinery.[125] RTI also assumed industry-wide compliance with the old standard of 1,000 $\mu g/m^3$.[126] Thus, RTI estimated only the incremental cost necessary to achieve compliance with the new PEL. This estimate necessarily was inaccurate, as some of the industry had not yet complied with the old standard, while other plants already had met the stricter new standard.[127] Further, industry witnesses testified that "substantial amounts of [recommended] controls are, in fact, in operation." [128]

OSHA found the industry's capital cost estimates to be overstated as well. Like RTI, the industry estimated only the costs of retrofitting old machines; it did not consider replacing them with new machines that are more productive and generate less dust.[129] Similarly, the in-

---

[124] OSHA excluded from its final standard equipment producing synthetic fibers because it does not generate cotton dust. Yet such equipment was included in the RTI estimates for cotton blend plants. 43 Fed. Reg. 27370 (1978). On the basis of RTI calculations, OSHA found that exclusion of equipment used to produce synthetics could reduce compliance costs by as much as 30 percent. *Id.* at 27372, 27380 Table I & n.4; OSHA Brief at 113.

[125] 43 Fed. Reg. 27370-71 (citing testimony of Dr. Parker C. Reist that the cost of control declines with more productive, new machines).

[126] *Id.* at 27370. The existing standard set the cotton dust exposure level at 1000 $\mu g/m^3$. *See* TAN 27 *supra* (history of the standard).

[127] 43 Fed. Reg. 27370.

[128] *Id.* (testimony of Harold Imbus and Hovan Hocutt).

[129] The agency included this statement in its reasons for concluding that the AMTI estimate was exaggerated:

> While OSHA recognizes the validity of estimating compliance costs for retrofit controls, OSHA also recognizes

dustry "may have included some equipment which is used exclusively for synthetics" and thus inappropriately included in cotton dust control cost estimates.[130] The agency also noted that the industry estimates failed to account for improvements in technology that can reasonably be expected during the four-year compliance period.[131]

Finding both sets of capital cost estimates in the record to be exaggerated, the agency chose to rely on the substantially lower industry estimate. Unlike the RTI study, the industry's assessment reflected concrete data on actual industry dust levels and use of controls.[132]

Ironically, it is now the industry that challenges the accuracy of its own data.[133] The textile industry petitioners argue that OSHA's reliance on the industry's capital cost estimate is invalid because it is "wholly unrelated to the exposure limits set by the Standard." [134] The industry notes that its $550 million figure was advanced as the projected capital cost of compliance with a PEL of 200 $\mu g/m^3$ in opening through roving, 500 $\mu g/m^3$ in spinning through warping, and 1000 $\mu g/m^3$ in

---

> the existing trend toward replacement of conventional machines with newer equipment which is more productive and produces less dust and which would lead to the prediction of fewer machines to be retrofitted or to be controlled [.]

43 Fed. Reg. 27372.

[130] *Id.*

[131] *Id.*

[132] AMTI cost estimates were based on a recent survey it conducted. 43 Fed. Reg. 27371 (1978). OSHA concluded, "Since AMTI estimates are based on more recent data, OSHA believes them to be more realistic than those offered by [RTI]." *Id.* at 27373.

[133] Textile Brief at 39.

[134] Textile Brief at 41.

slashing and weaving.[135] Thus, for spinning through weaving, the industry's estimate assumed a PEL requirement higher than the ones ultimately adopted—the 200 $\mu g/m^3$ level for spinning through warping and 750 $\mu g/m^3$ in slashing and weaving. The textile industry contends that by ignoring this fact, OSHA's final standard is based on a grossly understated cost estimate.

OSHA, however, marshals sufficient support and analysis for its decision to use the industry's capital cost estimate. Contrary to the industry's claim that this estimate is "wholly unrelated" to the PELs in the final standard, OSHA's technological assessment concluded that little more than the dust control measures assumed by the industry would be necessary to achieve the final PEL.[136] OSHA also explained that even the industry capital estimates were exaggerated because they included some unnecessary costs.[137] Thus, OSHA reasonably viewed the industry's figure as an overstated estimate for exposure levels set slightly higher than those in the agency's final standard.

Since the only other available figure was the far less accurate RTI estimate[138] the agency's ultimate reliance on the industry's capital cost estimate is reasonable. The RTI estimate lacked a basis in the industry's actual dust reduction. It also presumed a PEL for weaving and slashing far lower than the final PEL, which more nearly

---

[135] 43 Fed. Reg. 27371, 27380 Table I & n.1 (1978).

[136] OSHA Brief at 112 (discussing determination that local exhaust ventilation would not be necessary for spinning and twisting operations).

[137] *See* TAN 129 *supra*.

[138] *See* TAN 132 *supra*.

approximated the exposure level and control technology assumed by the industry.[139]

The very nature of economic analysis frequently imposes practical limits on the precision which reasonably can be required of the agency. This is especially the case where, as here, the industry chooses to withhold from the agency part of the data underlying the industry's cost estimates.[140] OSHA's mandate authorizes it to promulgate standards on the basis of the "best available evidence." [141] We find that OSHA reasonably evaluated the cost estimates before it, considered criticisms of each, and selected suitable estimates of compliance costs.[142]

---

[139] OSHA concluded:

> Most of the changes from the proposal in this final regulation have cost reducing effects. The principal cost reducing change is the increase in the permissible exposure level from 200 to 750 $\mu g/m^3$ for slashing and weaving. In some cases of control costs this difference in cost as a result of the higher PEL is not assessed. However, in other cases of control costs, such as slashing and weaving, because the need for certain engineering controls and/or amounts of air and filtration would be changed costs were shown to be reduced significantly. For this reason OSHA has adopted the [AMTI] estimate for slashing and weaving which predicted a level of 1,000 $\mu g/m^3$ instead of the RTI estimate for slashing and weaving at 200 $\mu g/m^3$.

43 Fed. Reg. 27371 (1978).

[140] The industry declined to give the agency access to its survey data or its detailed estimation methodology. 43 Fed. Reg. 27373; OSHA Brief at 113. This impaired the agency's ability to construct more accurate cost estimates once it found both the industry and RTI estimates inaccurate.

[141] 29 U.S.C. § 655(b)(5) (1976).

[142] *See* note 132 *supra*. OSHA decided to rely on the RTI estimates for the cost of non-engineering provisions, such as monitoring workers' health and providing respirators as needed. 43 Fed. Reg. 27372 (1978). OSHA considered these

b. Feasibility of compliance costs

The actual test for economic feasibility has yet to be fully developed by the courts.[143] This court has suggested that the costs cannot be "prohibitively expensive" for Congress would not have intended OSHA to make "financial viability generally impossible" for a regulated industry.[144]

Here, the agency had evidence in its record that the industry would be able to pass compliance costs on to consumers.[145] Although the record also contained testimony suggesting that older and smaller firms might bear a disproportionate financial burden,[146] it does not support the industry's claim of infeasibility. Even if a few firms are forced to shut down, the standard is not necessarily economically infeasible. As this court observed in *Industrial Union*,

> It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and

---

estimates to be overstated because they failed to account for compliance with these provisions in some plants prior to the standard, *id.* at 7372-73, but as the industry offered little evidence on non-engineering costs, OSHA reasonably relied on the RTI estimates.

[143] Berger & Riskin, *Economic and Technological Feasibility in Regulating Toxic Substances Under the Occupational Safety and Health Act*, 7 ECOLOGY L. Q. 285, 285-86 (1978).

[144] Industrial Union Department v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[145] 43 Fed. Reg. 27370 (RTI assumed that costs of compliance will be passed on).

[146] *Id.* at 27377-78 (citing testimony of Arthur Figh, Vice President, Chase Manhattan Bank).

> is consequently financially unable to comply with new standards as quickly as other employers.[147]

Here the agency expressly concluded "that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation." [148]

Of course, the agency's underlying cost estimates are not free from imprecision. Nonetheless, on reviewing the record we believe that OSHA fairly considered all the economic data submitted before constructing its estimates. The agency responded to significant criticisms of the cost estimates it used, and explained the economic impact it projected for the textile industry. As a result, this court is satisfied that OSHA has substantial support in the record for its cost estimates and findings of economic feasibility for the textile industry. The position of the union petitioners on this issue [149] buttresses

---

[147] Industrial Union Department v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[148] 43 Fed. Reg. 27378 (1978). Further, alleged changes in the market structure of the industry do not signify economic infeasibility especially here, where the agency observed that textile manufacturing already tends toward increasing concentration. *Id.*

[149] In *Industrial Union*, this court observed that "Congress does not appear to have intended to protect employees by putting their employers out of business." 499 F.2d at 478. The Union here submits that its support of the cotton dust standard "demonstrates that it will have no such result." Union Reply Brief at 25. *See* American Iron and Steel Institute v. OSHA, 577 F.2d 825, 836-37 (5th Cir. 1978), *petitions for cert. pending*, Nos. 78-911, 78-1036 (court attaches significance to Union support in determining economic feasibility of OSHA standard).

OSHA's conclusion that the standard will not put the industry out of business.[150]

3. *Cost-Benefit and Cost-Effectiveness Analysis*

Industry petitioners would have this court impose an additional constraint on OSHA's authority to determine standards. They claim that under the feasibility requirement, OSHA must demonstrate that "the benefits of the standard are in proportion with the costs which it imposes." [151] This amounts to a claim that no standard may be promulgated under section 6(b)(5) of the Act absent a formal cost-benefit analysis.[152] The industry

---

[150] The Union's assessment is not, however, determinative of the entire standard's economic feasibility. We must reject the Union's contention that the 750 $\mu g/m^3$ PEL which OSHA set for slashing and weaving operations must be remanded because it is not the lowest feasible exposure level. *See* Union Brief at 42. The record contains dose-response data showing reduced symptoms of byssinosis in the weaving area. 43 Fed. Reg. 27360 (1978) (discussing J.A. 218, 247, 361). OSHA determined that the presence of sizing in the weaving rooms tends to dilute the cotton dust and therefore allows for a greater permissible exposure level. Further, the technological obstacles to achieving a 200 $\mu g/m^3$ PEL in the weaving area pose extreme compliance costs. Meeting these costs would impede the industry's ability to achieve the 200 $\mu g/m^3$ level where it is more essential—in the opening through warping operations. *Id.; see* J.A. 2241-43. Thus, the agency reasonably adopted a higher PEL in slashing and weaving to permit compliance in the earlier stages of textile manufacturing where the dust exposure poses a more serious threat to health.

[151] Textile Brief at 53. In the industry's view, OSHA's failure to evaluate costs against benefits renders the agency's finding of economic feasibility invalid. *Id.* Similar arguments are made by National Cotton Counsel of America (NCCA), *see* NCCA Supplemental Brief at 15-16, and the petitioners from nontextile industries, *see* Nontextile Brief at 62-64.

[152] Cost-benefit analysis involves calculating the costs and benefits of various programs to compare their net present

similarly argues that OSHA must justify the expense imposed by its standard by comparing it with the industry's proposed alternative.[153]

OSHA agrees that a systematic evaluation of costs and benefits is to be *encouraged* within the limits of available estimation techniques,[154] yet it contends that such analysis is not *required.* OSHA argues that the OSH

---

values. E. QUADE, ANALYSIS FOR PUBLIC DECISIONS 26-27 (1975). A study by The National Academy of Sciences concluded that cost-benefit analysis

> is not a rule or formula which would make the decision or predetermine the choice for the decision maker. Rather, it refers to the systematic analysis and evaluation of alternative courses of action drawing upon the analytical tools and insights provided by economics and decision theory. It is a framework and a set of procedures to help organize the available information.

NATIONAL ACADEMY OF SCIENCES, DECISION MAKING FOR REGULATING CHEMICALS IN THE ENVIRONMENT 39 (1975) (report prepared by National Research Council).

[153] Textile Brief at 54, 56 (citing section 3(8) of the Act, 29 U.S.C. § 652(8) (1976)). Essentially, petitioners here claim that the agency should have conducted an analysis of the cost-effectiveness of both the agency's dust control strategy and the industry's proposed alternative. In contrast to cost-benefit analysis, cost-effectiveness is only used to compare alternatives for reaching the same goal. Like cost-benefit, cost-effectiveness analysis often raises intractable problems in obtaining the requisite measures that enable comparison. QUADE, *supra* note 152 at 25-28. Although the two kinds of analysis differ, the petitioners raise essentially the same claim with each one: they ask us to find OSHA's failure to employ these methods a fatal flaw in its proceedings.

[154] 43 Fed. Reg. 27378 (1978). The agency noted that "although the benefits of the standard cannot rationally be quantified in dollars, OSHA has given careful consideration to the question of whether these substantial costs are justified in the light of the hazards of exposure to cotton dust." *Id.* at 27379.

Act constrains its regulation of dangerous substances "only by the limits of feasibility." [155] We agree. We also find that no additional constraint is imposed by the Act's definition of a health or safety standard as "reasonably necessary or appropriate to provide safe or healthful employment." [156] The language of the Act and the clear intention of Congress permit no other conclusion.

Other statutory schemes explicitly require such particular kinds of analysis. In the Clean Air Act, for example, Congress required the Environmental Protection Agency to perform a "cost benefit analysis" before prohibiting the manufacture or sale of a fuel or fuel additive which endangers public health or welfare.[157] Some Congressional Acts require a showing of "unreasonable risk" prior to regulation.[158] The legislative histories of these acts have led the courts to construe this provision to require regulatory agencies to balance costs and benefits of proposed action.[159]

---

[155] *Id.* at 27378.

[156] 29 U.S.C. § 652(8) (1976).

[157] 42 U.S.C. § 1857f-6c(c)(2)(B) (1976). *See also* Federal Environmental Pesticide Control Act of 1972, 7 U.S.C. § 136 (bb) (1976) (determining "unreasonable risk to man or the environment" includes consideration of "economic, social, and environmental costs and benefits of the use of any pesticide").

[158] *E.g.*, Federal Hazardous Substances Act, 15 U.S.C. § 1261s (1976) (article is mechanical hazard if it presents "unreasonable risk of personal injury or illness"); Consumer Products Safety Act, 15 U.S.C. § 2058(c)(2)(A) (1976) (rule must be "reasonably necessary to eliminate or reduce an unreasonable risk of injury"); Toxic Substances Control Act, 15 U.S.C. § 2605(a) (1976) (requirements may be imposed if chemical presents "unreasonable risk of injury to health or the environment").

[159] *E.g.*, Forester v. Consumer Product Safety Comm'n, 559 F.2d 774, 789 (D.C. Cir. 1977) (footnote omitted):

> The requirement that the risk [posed by mechanical hazards] be "unreasonable" necessarily involves a balancing

In the OSH Act, in contrast, Congress itself struck the balance between costs and benefits in the mandate to the agency. Section 6(b)(5) unequivocally mandates OSHA to

> set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that *no employee will suffer material impairment* of health or functional capacity.[160]

Thus Congress concluded that the benefits of health protection warranted the expense of an effective standard.[161]

---

test like that familiar in tort law: The regulation may issue if the severity of the injury that may result from the product, factored by the likelihood of the injury, offsets the harm the regulation itself imposes upon manufacturers and consumers.

See also Aqua Slide "N" Dive v. Consumer Product Safety Comm'n, 569 F.2d 831, 839, 844 (5th Cir. 1978) (using *Forester* balancing test definition for "unreasonable risk"); *id.* at 845 (Wisdom, J., concurring) (requiring substantial evidence for Commission's cost-benefit analysis).

As OSHA points out, when Congress wishes to require cost-benefit analysis, it does so explicitly; when it wishes a feasibility constraint instead, it so states. *See* OSHA Brief at 121 n.96 (citing legislative history of Mine Safety and Health Amendments of 1977, where Congress rejected amendments that would insert cost-benefit analysis).

[160] 29 U.S.C. § 655(b)(5) (1976) (emphasis added).

[161] Senator Eagleton, for example, stated during floor debates on the Act that

> The Costs that will be incurred by employers in meeting the standards of health and safety to be established under this bill are, in my view, reasonable and necessary costs of doing business. Whether we, as individuals are motivated by simple humanity or by simple economics, we can no longer permit profits to be dependent upon an unsafe or unhealthy workplace.

LEGIS. HIST. at 1150-51 (from the Congressional Record, Senate, Dec. 16, 1970).

In the legislative debates on the Act, Senator Yarborough who sponsored the bill responded in no uncertain terms to the claim that the proposed legislation would be too expensive:[162]

> We are talking about people's lives, not the indifference of some cost accountants. . . . We are talking about assuring our American workers who work with deadly chemicals that when they have accumulated a few years seniority they will not have accumulated *lung congestion* and poison in their bodies, or something that will strike them down before they reach retirement age.[163]

In contrast to the Acts for which Congress contemplated a cost-benefit requirement, the legislative history of the OSH Act contains no reference to this kind of economic analysis.[164]

---

[162] Senator Yarborough preceded the statement quoted in text with this comment:

> [W]hen Congressman O'Hara and I introduced into the House and Senate the first comprehensive occupational health and safety bill, we drew the critical fire of several organizations who claim that legislation of this type is too expensive.
>
> One may well ask too expensive to whom? Is it too expensive for the company who for lack of proper safety equipment loses the service of its skilled employees? Is it too expensive for the employee who loses his hand or leg or eyesight? Is it too expensive for the widow trying to raise her children on meager allowance under workman's compensation and social security? And what about the man—a good hard-working man—tied to a wheel chair or hospital bed for the rest of his life? That is what we are dealing with when we talk about industrial safety.

LEGIS. HIST. at 510.

[163] *Id.* (emphasis added).

[164] Instead, Congress anticipated severe costs from the health and safety standards and provided a program of loans

Instead, Congress determined in the OSH Act that any severe risk to employee health must be eliminated or reduced if feasible means to do so exist.[165] This calls for a two-step analysis by the agency: (1) determining whether health impairment is threatened by the suspect substance, and (2) determining whether the selected strategy is to protect workers from this risk is both technologically and economically feasible. Nothing in the statute or its legislative history requires a further determination that the costs of the standard bear a "reasonable" relationship to its benefits.[166] Nor may this court impose

---

to small businesses seriously affected by OSHA standards. *See* section 28 of the Act (amending section 7(b) of the Small Businesses Act, 15 U.S.C. § 636 (1976)); Cong. Record (Senate) (Nov. 17, 1970), LEGIS. HIST. at 525-26 (remarks of Sen. Dominick).

[165] The House Report concluded:

> Even the price of one life is too expensive when a meaningful occupational safety and health law could save many lives. . . . The well-being of every American working man and woman is an essential human right which we can no longer deny.

H.R. Rep. No. 91-1291, 91st Cong., 2d Sess. 35 (1970), *reprinted in* LEGIS. HIST. at 865.

[166] Petitioners mistakenly believe that cost-benefit or cost-effectiveness analysis is mandated by the "reasonably necessary or appropriate" language in the Act's definition of health and safety standards. In another context, this court construed the familiar "necessary or appropriate" provision as authorizing "an agency to use means of regulation not spelled out in detail, provided the agency's action conforms with the purposes and policies of Congress and does not contravene any terms of the Act." Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 158 (D.C. Cir. 1967). In this light, the "reasonably necessary or appropriate" language grants OSHA considerable discretion in adopting protective strategies to guard against particular health risks. While cost-benefit and cost-effectiveness analyses are techniques that can assist evaluations of such strategies, they are not required by the Act's provisions.

additional procedural requirements.[167] Indeed, the only authorities cited by petitioners are not binding on this circuit,[168] and in any event, they are not persuasive in this context.[169]

---

[167] Under the Supreme Court's decision in Vermont Yankee Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 524 (1978), this court may not require OSHA to conduct cost-benefit analysis unless the agency or Congress officially requires this procedure. Such analysis is certainly not mandated in explicit terms by the statute. Nor is it implicated in the extra-statutory procedures OSHA followed in promulgating the cotton dust standard. *See* TAN 54-55 *supra* (discussing OSHA's additional procedures); *Judicial Review of Informal Rulemaking Procedure: When May Something More Formal Be Required?*, 27 AM. U. L. REV. 781, 811 (1978).

[168] Petitioners rely on Turner Co. v. Sec'y of Labor, 561 F.2d 82 (7th Cir. 1977) (noise abatement enforcement action) and three cases of another circuit, American Petroleum Institute v. OSHA, 581 F.2d 4931 (5th Cir. 1978), *cert. granted*, 47 U.S.L.W. 3554 (Feb. 20, 1979) (Nos. 78-911, 78-1036); Aqua Slide "N" Dive Corp. v. Consumer Product Safety Commission, 569 F.2d 831, 844 (5th Cir. 1978) (swimming pool slides); and Florida Peach Growers Ass'n v. Dep't of Labor, 489 F.2d 120 (5th Cir. 1974) (pesticide residue). *See* Textile Brief at 37-38, 53-59.

This court, however, is bound by its construction of the feasibility requirement in Industrial Union Department v. Hodgson, 499 F.2d 467, 477-78 (D.C. Cir. 1974) (asbestos dust), which has been adopted in American Iron & Steel Inst. v. OSHA, 477 F.2d 825, 835-36 (3d Cir. 1978) (coke oven emissions), *petitions for cert. pending*, Nos. 78-918, 78-919; AFL-CIO v. Brennan, 530 F.2d 109 (3d Cir. 1975) (revoking rule against permitting any workers' hands in machine dies). *See* TAN 92-94 *supra*.

[169] Petitioners' reliance on American Petroleum, *supra*, is especially unpersuasive. The Fifth Circuit there based its holding on its earlier interpretation of an entirely different statutory scheme in Aqua Slide "N" Dive Corp. v. Consumer Product Safety Commission, *supra*. *Aqua Slide* involved the Consumer Products Safety Act, 15 U.S.C. § 2058(c)(2)(A) (1976), which employs the "unreasonable risk" language

Further, cost-benefit analysis would not necessarily improve agency health and safety determinations.[170] These techniques require the expression of costs, benefits and performance in often arbitrary, measureable terms.[171] They may hide assumptions and qualifications in the

---

that courts have construed to require a balancing test. *See* n.158 *supra*. No such language appears in the OSH Act provisions under which the cotton dust standard was issued. Congress apparently drew the sensible conclusion that consumers often may be in a better position than workers to estimate and avoid risks. Petitioners' view that the "reasonably necessary or appropriate" language requires cost-benefit analysis, Textile Brief at 55, is similarly misguided. *See* TAN 156 *supra*.

Finally, petitioners mistakenly rely on two more cases from other circuits that have little relevance to this case. *Florida Peach Growers Association v. Dep't of Labor*, *supra*, concerned the issuance of emergency standards under § 6(c) of the Act, 29 U.S.C. §)655(c) (1976). *Turner Co. v. Sec'y of Labor*, *supra*, similarly is inapposite. It involved the appeal of an enforcement proceeding against a single manufacturer under an existing noise standard. Although requiring a cost-effectiveness analysis by the agency the Seventh Circuit in *Turner Co.* explicitly endeavored to distinguish the noise regulated in that case from other hazards that pose "serious debilitating threats." *Id.* at 86. Just such a serious risk is posed by cotton dust exposure.

[170] *See* P. Schuck, *Regulation: Asking the Right Questions*, 11 NAT'L J. 711, 711 (1979):

> Cost-benefit analyses are also invariably flawed. The reasons for this are well-known: the difficulty of identifying and quantifying many costs and benefits; the inevitably arbitrary nature of valuations of human life or health; . . . the problem of interpersonal and intergenerational comparisons of utility; and many others.

[171] The National Academy of Sciences report, *supra* at 39-44, identifies this measurement problem and the general difficulty of estimating uncertain effects as serious shortcomings of cost-benefit analysis. For a similar view, *see* QUADE, *supra* at 25-26.

seeming objectivity of numerical estimates. Especially where a policy aims to protect the health and lives of thousands of people, the difficulties in comparing widely dispersed benefits with more concentrated and calculable costs may overwhelm the advantages of such analysis.[172]

OSHA considered the alternative proposed by the industry and found it inadequate to protect against the health risk at issue. We recognize that the agency's control strategy is costly. But it is the result of long and comprehensive investigation by the agency assisted by extensive public participation.[173] We find that the health risk posed by cotton dust warranted agency action, and that the final standard chosen by the agency is technologically and economically feasible for the textile industry within the meaning of the Act.[174]

IV. Non-Textile Industries

In the final standard, OSHA set a permissible exposure level of 500 $\mu g/m^3$ for all non-textile industries covered by the standard.[175] Three such industries here

---

[172] Not only are the benefits of the regulation dispersed over thousands of people, they are also spread over lifetimes. The delayed effect of cotton dust exposure causes one of the difficulties in estimating its harm. In directing OSHA to promulgate standards on the basis of the "best available evidence," 29 U.S.C. § 655(b)(5) (1976), Congress wished to avoid administrative paralysis caused by experts' debates. H.R. No. 91-1291, 91st Cong., 2d Sess. 18 (1970), Legis. Hist. at 848. Certainly, it would not have wanted administrative paralysis caused by debate over a standard's cost and benefits.

[173] *See* TAN 30-34 *supra.*

[174] *See* TAN 97-150 *supra.*

[175] 43 Fed. Reg. 27360, 27395 (1978) (§ 1919.1043(c)(3)) (standard for all workplaces except yarn manufacturing and slashing and weaving).

challenge the standard:[176] (1) the cottonseed oil mills, which process cottonseed and its byproducts; (2) the cotton warehouses, which store raw, baled cotton; and (3) the classing offices, which classify samples of cotton fiber.[177]

The non-textile petitioners claim that OSHA failed to establish that their workers risk material health impairment and that the PEL set for these industries is arbitrary. Further, they claim that the standard is infeasible on both technological and economic grounds.

A. *Health Risks and Permissible Dust Exposure*

Petitioners do not dispute that their employees are exposed to cotton dust,[178] often at higher levels than in textile mills. They assert, however, that the work processes, dust composition, and worker exposure to dust in nontextile industries differ significantly from the textile industry.[179] In this way, petitioners seek to challenge OSHA's general position that exposure to cotton

---

[176] *See also* note 1 *supra*.

[177] Non-Textile Brief at 4. OSHA explained that the standard applies to

> all non-textile industries including but not limited to: warehousing, compressing of cotton lint, classing and marketing, using cotton yarn (i.e., knitting), reclaiming and marketing of textile manufacturing waste, delinting of cottonseed, marketing and converting linters, reclaiming and marketing of gin motes and batting, yarn felt manufacturing using waste cotton fibers and by products.

43 Fed. Reg. 27360 (1978).

[178] Instead, petitioners argue that the composition of the dust in their workplaces differs from the dust in textile mills, Non-Textile Brief at 34-38.

[179] *E.g.*, Non-Textile Brief at 33.

dust poses a serious hazard to workers regardless of where the dust is encountered.[180]

The exact nature of the health hazard posed by cotton dust remains subject to medical debate.[181] The agency had before it conclusive evidence that dust found in textile mills causes debilitating disease;[182] it also had some evidence of related, though less severe, health impairments among workers in nontextile industries.[183] Although petitioners point to differences among the industries, OSHA's mandate requires it ot protect workers in all industries.[184] We find that OSHA fulfilled this mandate by reasonably relying on medical evidence from the textile industry[185] and evidence of health impairments

---

[180] *See* 43 Fed. Reg. 27360-61 (1978).

[181] Petitioners claim that the bract and leaf-like trash is the element in cotton dust most likely to cause disease. Non-Textile Brief at 34. On this theory, petitioners attempt to distinguish the dust in their industries from the dust in the textile mills. *Id.* at 35-39. In so doing, petitioners rely on some studies that were not in the rulemaking record, *id.* at 34 n. 103, and ignore others actually in the record that contradict their conclusion, *see, e.g.*, J.A. 12.1 (Dr. Bouhuys). The agency fully explains the nature of the debate. 43 Fed. Reg. 27354 (1978). This court will not reach beyond the record to displace the agency's judgment that conclusive evidence is not yet available to isolate the causal agent.

[182] *See* Part III *supra.*

[183] *E.g.*, Report on the Evaluation of Respiratory Effects of Cottonseed Dust Inhalation (1976) (Jones & Weill study), J.A. 408-35 (acute broncho-constrictor effect in cottonseed oil mill employees); Testimony of Dr. Martin Barman, J.A. 2972 (1978) (pulmonary function decrements in warehouse employees)

[184] 29 U.S.C. § 655(b) (5) (1976).

[185] Courts have approved OSHA's extrapolations from evidence of carcinogens in one industry to another, related industry, *e.g.*, Soc'y of Plastics v. OSHA, 509 F.2d 1301, 1310

among nontextile workers.[186] The differences in the industries that were cited by petitioners do not undermine the agency's determination.

(2d Cir. 1975) (fabricators of products using PVC resins). This court has permitted an agency to draw on studies of one carcinogent to regulate another, related substance. EDF v. EPA, 578 F.2d 63, 83-85, (D.C. Cir. 1978) (approving extrapolation from knowledge about highly chlorinated polychlorinated biphenyls (PCBS) to less chlorinated PCBs). Petitioners claim that this case is inapplicable here because the court relied on the "ample margin of safety" section 307(a) of provision in Federal Water Pollution Control Act Amendments of 1972. 33 U.S.C. § 1317(a) (1976). Non-Textile Reply Brief at 16-17. For the purposes of permitting extrapolations, OSHA's duty to ensure that "no employee will suffer material impairment of health," 29 U.S.C. § 655(b)(5), is no less protective than the "ample margin of safety" provision. Further, deference to agency expertise and recognition of administrative feasibility also contributed to this court's approval of the agency's use of inference and extrapolation in *EDF v. EPA*. *Id.* at 46-48. These considerations apply with equal force here. *See also* American Federation of Labor v. Brennan, 530 F.2d at 115 (reviewing court does not sit to determine "scientific superiority" of agency's extrapolations).

[186] OSHA pointed to foreign studies of severe health impairments in nontextile industries, *e.g.*, Noweir, *et al.*, *Exposure to dust in the Cottonseed Oil Extraction Industry*, 19 ARCH. ENVIRON. HEALTH 99 (1969), J.A. 3210 (byssinotic symptoms in 35 out of 110 cottonseed oil mill workers); Barnes & Simpson, *Ventilary Capacity Changes on Expsoure to Cotton Dust*, MED. J. OF AUSTRALIA, 897 (May 25, 1968), J.A. 3218 (chest tightness and wheezing among workers in delinting and cottonseed storage industries). Petitioners criticize OSHA's reliance on these studies because the foreign plants differ from domestic ones. J.A. 3319; Non-Textile Brief at 23-26.

OSHA also had evidence of lung impairments in domestic nontextile industries, but generally these effects were less severe. (*E.g.*, Statement of Dr. K. D. McMurrain, J.A. 2719. (reviewing Jones and Weill Study of cottonseed oil mills).

The agency did acknowledge that health effects in the nontextile industries appear to be less prevalent and less severe than in the textile mills,[187] but concluded that the individual nontextile workers still run the risk of material health impairment. The agency reasoned that high worker turnover and movement in the workplace, rather than a lesser risk from exposure to dust, may explain the less severe aggregate pattern of disease.[188] We find no reason to disturb this judgment in favor of the more dubious conclusion that the nontextile workers are not endangered.

Moreover, the agency took account of the pattern of health effects when it raised the final PEL for the nontextile industries to 500 $\mu g/m^3$ from the proposed 200 $\mu g/m^3$ level.[189] The agency fairly concluded that the industries' data lent guidance to the permissible dust exposure level, but did not cast doubt on the agency's evidence of health risks to nontextile workers.[190]

---

[187] 43 Fed. Reg. 27361 (1978).

[188] *Id.* (citing Statement of Phillip J. Wakelyn, National Cotton Council of American, J.A. 2698-2704, and other testimony in the record).

[189] 43 Fed. Reg. 27355 (1978).

[190] *Id.* The industry challenges the PEL as arbitrary. OSHA admits that "in the absence of detailed dose-response data, the risk to workers from cotton dust generated in many segments of the non-textile industry cannot be precisely defined." *Id.* Yet OSHA's mandate calls for standards "expressed in terms of objective criteria and of performance desired" whenever practicable. 29 U.S.C. § 655(b)(5)(5) (1976). To this end, the agency reasonably selected the PEL of 500 $\mu g/m^3$. The agency explained that this level for only respirable dust is roughly equivalent to the pre-existing theshold limit of 1.0 mg/m^3 of total dust. 43 Fed. Reg. 27361 (1978). *See* TAN 24-26 *supra*. Although expressing reservations, Merchant suggested 500 $\mu g/m^3$ as "not an unreasonable approach" pending further study. Tr. 1297, J.A. 3696. We agree.

OSHA thus explained the evidence it used, the reasons for its conclusions, and its responses to the industries' evidence and objections. When agencies are entrusted with regulating risks on the frontiers of scientific and medical knowledge, we cannot ask for more.[191]

Petitioners nevertheless argue that we should find it arbitrary and unreasonable for OSHA to set the standard before NIOSH completes its study of the nontextile industries.[192] Certainly, OSHA should take advantage of the ongoing research of NIOSH and other major inquiries into occupational health and safety. But by law, OSHA need not wait for NIOSH recommendations before protecting against occupational health risks.[193] Nor are

---

[191] *See* Amoco Oil Co. v. EPA, 501 F.2d 722, 741 (D.C. Cir. 1974):

> Where . . . the regulations turn on choices of policy, on an assessment of risks, or on predictions dealing with matters on the frontiers of scientific knowledge, we will demand adequate reasons and explanations, but not "findings" of the sort familiar from the world of adjudication.

In Soc'y of Plastics v. OSHA, 509 F.2d at 1308, the Second Circuit observed that "though the factual finger points, it does not conclude." Nonetheless, the court concluded that OSHA is authorized "to act even in circumstances where existing methodology or research is deficient." *Id.*

[192] Non-Textile Brief at 42-44; Non-Textile Reply Brief at 10-14. Petitioners cite a NIOSH statement that identifies the limitations existing studies on non-textile cotton dust exposure. Non-Textile Brief at 42-44 (citing NIOSH Supporting Statement: Characteristics of Byssinosis in Segments of the Cotton Industry—Mattresses and Cotton Matting, Cottonseed Oil, Waste Recyclers, Cotton Warehousers and Cotton Classification Officers, J.A. 3036). NIOSH's criticisms were written to justify its decision to study the area, not to dispute the health risk posed by cotton dust in the non-textile industries.

[193] 29 U.S.C. § 655(b) (1976). Indeed, the Secretary may initiate the regulatory process on the basis of information submitted in writing to him by any interested person. 29

such recommendations conclusive.[194] A legitimate challenge to a health and safety standard can be raised as new data emerges,[195] but OSHA did not exceed its authority by regulating as soon as it knew of the risks of material health impairment from dust exposure.[196]

B. *Feasibility*

Judgments about the technological capabilities and financial positions of the industries affected by the stand-

---

U.S.C. § 655(b)(1). OSHA is to base its standards on the "latest available scientific data in the field," 29 U.S.C. § 655 (b)(5), but it is not required to wait for data that is not yet available.

[194] NIOSH was created to assist OSHA in carrying out its general purposes and in fulfilling the research and training provisions of the statute. 29 U.S.C. § 671 (1978). This court determined that OSHA must consider all information made available by interested parties and experts, so determinations of NIOSH are only one factor in OSHA's deliberations. 499 F.2d at 476-77.

[195] An agency has a duty to revise its standards in light of new information. *See* Public Service Comm'n v. FPC, 511 F.2d 338 (D.C. Cir. 1975). OSHA has commendably committed itself to reviewing the standard it set for cotton gins "at the end of five years, or earlier if sufficient evidence of the need for a specific exposure limit is presented." 43 Fed. Reg. 27424 (1978) (standard to appear at 29 C.F.R. § 1910.1046, 1928.21). It would seem advisable for it to undertake a similar commitment for the non-textile standard at issue here.

[196] There seems no limit to petitioners' claim that OSHA has to wait for a pending study before promulgating the standard. After that study, there would always be another study, and then another, that could be deemed necessary contribution to the regulation. Congress did not intend OSHA to "be paralyzed by debate surrounding diverse medical opinion." H.Rep. 91-1291, 91st Cong., 2d Sess. at 18 (1970), *reprinted in* LEGIS. HIST. at 843. Rather, at OSHA concluded in this instance, "[p]rotection of employees cannot await resolution of all the points of scientific debate." 43 Fed. Reg. 27355 (1978).

ard depend on the evidence for each one, so we examine evidence on the warehouse, classing office, and cottonseed oil mill industries.

1. *Warehouses and Classing Offices*

The warehousing industry does not dispute the feasibility of the standard. Indeed, OSHA determined that most warehouses are already in compliance with the standard now that the final PEL for that industry has been raised to 500 $\mu g/m^3$.[197] For those portions of the industry not in compliance, the record indicates that improved ventilation and housekeeping will adequately assure compliance.[198]

OSHA also reasonably concluded that most classing offices[199] are "substantially in compliance" with the 500 $\mu g/m^3$ PEL.[200] Where dust control is necessary, the rec-

---

[197] 43 Fed. Reg. 27368 (1978); J.A. 2961 (Statement of Phillip Wakelyn); J.A. 3008 (Nat'l Cotton Council of America, Economic Impact of OSHA's Proposed Cotton Dust Standard on Cotton Warehouses, 1977) (hereinafter cited as NCCA Warehouse Study). The industry and the agency both calculated exposure levels on a time-weighted basis, that is, averaged over a work day, because workers move in and out of dusty areas over the course of a day. NCCA Warehouse Study, J.A. 3010; Statement of Phillip Wakelyn, J.A. 2962; 43 Fed. Reg. 27395 (1978) (§ 1910.1043(c)(3)).

[198] *See* 43 Fed. Reg. 27368; NCCA Warehouse Study, J.A. 3009-11.

[199] Classing offices classify grades of raw cotton by examining small samples. *See* TAN 177 *supra*.

[200] 43 Fed. Reg. 27362 (1978). This finding is supported in the record. *See* J.A. 2339-40 (Hodgkins, Dep't of Agriculture, Control of Dust Levels in Cotton Classing Offices). As in warehouses, dust exposure in classing offices is calculated on a time-weighted basis. J.A. 3132 (Statement of American Cotton Shippers Association); 43 Fed. Reg. 27395 (1978) (§ 1910.1043(c)(3)).

ord supports OSHA's finding that minor ventilation modifications can effectively reduce dust exposure in classing offices to the requisite level.[201]

Thus we uphold the agency's finding that dust control is both technologically and economically feasible for warehousing and classing offices. These two industries claim, however, that non-engineering controls required by OSHA—medical surveillance and provision of respirators —will impose burdensome and unjustified costs.[202] Congress itself rejected this claim. It authorized the agency to regulate even if industries become financially burdened,[203] so long as the burden is not "prohibitively expensive." [204] OSHA need not "justify" its health and safety standards through a cost-benefit analysis [205] as the petitioners imply. Rather, OSHA must simply establish the risk of material health impairment and demonstrate the economic and technological feasibility of its standard for the regulated industries.[206] We hold that it has satisfied these requirements for the warehousing and classing office industries.

---

[201] *See* 43 Fed. Reg. 27368 (1978); J.A. 2339-40 (Hodgkins, Dep't of Agriculture, Control of Dust Levels in Cotton Classing Offices).

[202] Non-Textile Brief at 60-62. As these petitioners maintain that OSHA failed to demonstrate a material health hazard in either the warehousing or classing office industries, they argue that the costs of complying with the standard are "completely unjustified." *Id.* at 63.

[203] *See* TAN 93-99 *supra*.

[204] Industrial Union Dep't v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[205] *See* TAN 155-74 *supra*.

[206] *See* TAN 166 *supra*.

2. *Cottonseed Oil Mills*

Perhaps the most hotly contested aspect of the standard is its feasibility for the cottonseed oil industry. OSHA admits that considerable effort will be required for this industry to comply with the standard. We find that OSHA has adequately demonstrated the technological feasibility of the standard for this industry, but the record does not sufficiently establish its economic feasibility.

First, the record does sufficiently support the agency's conclusion that existing methods of dust control will permit compliance with the dust exposure level set for this industry. OSHA relied in part on evidence of dust control techniques already effective in related industries.[207] It also found support in the industry's own theoretical study that was designed as if the authors "were consulting engineers given the task of lowering dust levels in a typical cottonseed oil mill to the lowest feasible level." [208] As that study was commissioned by the industry in response to the proposed 200 $\mu g/m^3$ PEL,[209] we find no reason to disturb the agency's judg-

---

[207] Ventilation, enclosure of dusty areas, use of modern equipment, and placement of hoods over particularly dusty machinery are techniques used in other industries that OSHA found applicable to the cottonseed oil mills. 43 Fed. Reg. 27369 (1978). *See* J.A. 1490 (Baier Statement); 2741 (Parnell Statement).

[208] OSHA relied on a theoretical study conducted by Dr. Calvin Parnell, Jr. for the National Cottonseed Products Association. *See* J.A. 2735 (Parnell Statement); J.A. 2865 (Parnell Study). The study described specific engineering controls and their costs for "a typical cottonseed oil mill processing 200 to 225 tons per day." J.A. 2868.

[209] The study did not specify the dust levels that would result from adoption of its recommended techniques for dust control. Parnell observed that "in accepting this assignment it was stipulated that the personnel working on this project

ment that the techniques proposed by the study would allow compliance with the final 500 $\mu g/m^3$ PEL.[210] Agencies are permitted to rely on estimates and policy judgments of this kind so long as they are fully explained and authorized by statute.[211] We therefore affirm the agency's finding of technological feasibility for this industry.

The agency's position on economic feasibility, in contrast, is neither clear nor adequately supported by the record. OSHA acknowledged that "[m]uch of the testimony on cottonseed processing . . . predicted dire eco-

---

would not attempt to estimate the final concentrations that would result after implementation of these proposed engineering controls." J.A. 2875. The study was, however, commissioned by the industry in response to the proposed 200 $\mu g/m^3$ PEL, J.A. 2871, and did not find it impossible to attain that level.

[210] In addition to the claims addressed above the industry tries to bolster its infeasibility claim with the fact that the standard has not previously been enforced against the non-textile industries. Non-Textile Brief at 9 n.17. This previous history establishes only that a more limited definition of cotton dust prevailed before this standard was promulgated. *See* Sec'y v. Buckeye Cellulose Corp., OSHARC Doc. No. 1919 (Aug. 13, 1973), 367, J.A. 3246 (concerning cotton linters, a substance removed from cottonseed by the cottonseed oil mills). The standard before us employs a different, broader definition of cotton dust that includes the airborne dust in the non-textile industries. *See* Note 14 *supra*.

[211] Industrial Union v. Hodgson, 499 F.2d at 475-476. The Supreme Court noted recently that "complete factual support in the record for the [agency's] judgment or prediction is not possible or required" where assessments of future events are at issue. FCC v. Nat'l Citizens Comm. for Broadcasting, 98 S.Ct. 2096, 2122 (1978) (regulation of common ownership of broadcast station and newspaper in same community). *See also* Bradford Nat'l Clearing Corp. v. SEC, 590 F.2d 1085, 1103-04 (D.C. Cir. 1978) (judicial deference to agency increases where agency decision based primarily on predictions).

nomic effects including a substantial number of plant closings." [212] The industry estimated that 62 of the existing 83 mills, or approximately 52 percent of the industry's production capacity, will be forced to shut down if the standard is put into effect.[213]

In response, OSHA merely criticized the industry's estimate without constructing an alternative or fully explaining the basis for its criticism.[214] For example, OSHA suggested that the industry calculated "retrofit" costs twice.[215] Yet the agency never located these cal-

---

[212] 43 Fed. Reg. 27374 (1978).

[213] Development and Planning Research Association, The Economic Impact of Proposed Cotton Dust Standards on the Cottonseed Processing Industry, VIII-8, J.A. 2855 (hereinafter cited as Cottonseed Impact Study). *See also* Tr. 3412-27, J.A. 4134-40 (Testimony of Mr. Wiseman, Vice-President of Development and Planning Research Association).

[214] 43 Fed. Reg. 27376.

[215] OSHA's position on "retrofit" estimate is in fact ambiguous. First, it explains that the industry's economic impact study devised an estimate that is 40 percent higher than the cost estimate of Parnell, designer of the theoretical technology assessment. 43 Fed. Reg. 27375 (1978). Yet OSHA admitted that "in the absence of further justification and breakdown of these costs by the industry, OSHA is unable to discount this economic impact estimate by any percentage." *Id.* Part of the confusion stems from the term "retrofit costs." Parnell explained that he used the term "retrofit" to mean costs he had not estimated for special space and construction problems in implementing the controls in particular, older plants. Tr. 3415-16, J.A. 4132-33. OSHA acknowledged that Parnell's "cost tables do not appear to reflect any such costs," yet claimed that Parnell's enclosure and isolation specifications may have entailed some of the costs also represented by the retrofit figure. None of OSHA's citations to Parnell's Study compare Parnell's figures with the "retrofit" cost. Moreover, it is Parnell's own statement that he did not include in his estimates the costs of modifications he called "retrofit." Tr. 3416, J.A. 4133. Thus, the record contains no evidence to support OSHA's claim that retrofit costs were included twice.

culations in the record nor identified the amount by which the cost estimate should be reduced to eliminate double-counting. Similarly, OSHA asserted without further explanation that the industry overstated production losses because the dust control strategy was designed to minimize such losses.[216] Also, OSHA claimed that the industry's cost estimate fails to acknowledge existing compliance with the standard, but the only evidence OSHA provides is the existence of a medical surveillance program in one company.[217] Absent more evidence on the extent of existing compliance, or the other asserted grounds of overestimation, we are unable to determine whether the industry's total cost estimate is unreasonable, as the agency contends. Even if the industry's estimate is exaggerated, OSHA offered no evidence that the cost of compliance will not cause "serious disruption," as petitioners claim.[218]

---

[216] OSHA noted that the industry's estimated production losses were explained only as a result of reduced efficiency. 43 Fed. Reg. 27375 (1978). *See* Tr. 3421, J.A. 4134 (Testimony of Mr. Wiseman). OSHA concluded that such estimates were to some extent overstated because "Parnell's design study did include instances where the choice of design was based on the need to maintain efficiency." *Id.* This general statement is not clarified by citation to Parnell's Study, and thus this court finds no evidence in the record to support the agency's position on production losses.

[217] The agency cites one industry representative who "said the Buckeye division already had a medical surveillance program." 43 Fed. Reg. 27375 (1978) (citing Tr. 3396, 3397, 3410) (not included in Joint Appendix). The agency also noted that other industry representatives said "they did not know how many mills had surveillance programs." 43 Fed. Reg. 27375 (1978). Ignorance about the extent of compliance with one aspect of the standard, bolstered only by evidence of a medical surveillance program in one firm, cannot support the conclusion that incremental compliance costs will differ significantly from the industry's total estimates.

[218] *See* Cottonseed Impact Study, J.A. 2855.

Instead, the agency concedes that the standard may "accelerate" an existing trend of financial and economic decline in the cottonseed oil industry.[219] The agency apparently assumed that the standard's economic feasibility is not challenged because other factors will contribute to the anticipated shutdowns. In so assuming, the agency fails to indicate the number of shutdowns it anticipates or the role that the standard, as opposed to other economic pressures, will play in plant closings.[220]

---

[219] OSHA asserts that

> to the extent that the existing secular decline in the number of mills continues and is accelerated by the costs of complying with the 500 $\mu g/m^3$ regulation, the industry estimate overstates the prediction of the capital costs of compliance by including the costs of all 83 firms presently in operation.

43 Fed. Reg. 27376 (1978). The force of this reasoning eludes us. The agency apparently concedes that the standard will contribute to the closing of some mills. Certainly, if some mills close, the industry's total compliance costs will decline. But this logic sidesteps the issue at hand: will the anticipated shut-downs so devastate the industray as to render the standard economically infeasible? *See* 499 F.2d at 477-78. Absent clearer indication of the agency's position, we cannot reach the question of what portion of an industry must be crippled by a standard for it to be deemed economically infeasible.

[220] As this court observed in *Industrial Union*,

> It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers. As the effect becomes more widespread within an industry, the problem of economic feasibility becomes more pressing.

499 F.2d at 478 (citation omitted). Without a clearer indication of the agency's reasoning in this case, we are unable to discern whether the scope of the anticipated shutdowns is consistent with the purposes of the Act or whether instead it

As a result, this court has no basis for reviewing the agency's conclusion that the standard is economically feasible for the cottonseed oil industry.[221]

Finally, the agency suggests that the industry will be able to pass the costs of the standard back to cotton growers.[222] OSHA argues that cotton growers will inevitably have a constant supply of cottonseed and will be willing to accept a lower price for the seed, shifting the loss forward to purchasers of raw cotton.[223] But the agency adduces no evidence or testimony to support this theory. In fact, the record shows only the contrary conclusion, drawn by the industry's economic impact study, that cotton producers will switch to other produce if the

---

begins to put the standard's economic feasibility in jeopardy. Nor are we given a cost estimate that can be apportioned to the surviving mills, and thus no evidence as to their ability to bear the costs of the standard.

[221] The agency's position is too ambiguous for us to fully comprehend. Its apparent conclusion is that

> Some firms which may experience losses or *may apparently be marginal* in their profit position may decide to close. OSHA does not view such closings *necessary* as a result of regulation in view of secular decline in the number of oil mills over the decade.

43 Fed. Reg. 27376 (1978) (emphasis added).

[222] 43 Fed. Reg. 27375 (1978). OSHA acknowledges that it is unlikely that costs could be passed forward in the form of higher prices for cottonseed products. *Id.*

[223] [S]ince seed is a fiber byproduct, input supply for the industry is likely to be very price inelastic (amount of seed available generally remains the same regardless of price). Seed prices are subject to modification and costs as reflected in reduction of seed prices can be shifted forward by the fiber producers to the buyers of their main product, raw cotton.

43 Fed. Reg. 27375 (1978).

industry seeks to lower the price of cotton byproducts.[224] OSHA itself acknowledges that many past shutdowns of cottonseed oil mills have been due to contractions in the supply of cottonseed.[225] Absent more information, this court cannot determine whether the agency's cost pass-back theory adequately responds to the industry's estimate of massive shutdowns.

If the constraint of economic feasibility is to have any effect on the agency's rulemaking, it demands more serious consideration than it was given here.[226] The agency is allowed to rely on the best available evidence,[227] but here it simply gives general criticisms of the cottonseed industry's cost estimate. It failed to offer an alternative estimate of the standard's impact on this industry. As a result, the agency's position is too unclear to permit us to complete our reviewing function. We therefore re-

---

[224] Cottonseed Impact Study, J.A. 2850; Tr. 3423-24, J.A. 4136037 (Testimony of Mr. Wiseman).

The study also concluded that assumptions about browers' conduct would not be made with confidence in light of the anticipated disruption from the entire standard. OSHA asserted that the final standard would not be disruptive, OSHA Brief at 118 n.94, but this would suggest only that it would not be impossible on that ground alone for costs to be passed back to the growers.

[225] 43 Fed. Reg. 27376 (1978) (citing Cottonseed Impact Study, J.A. 2781).

[226] In contrast, the agency carefully constructed a cost estimate for the standard's impact on the textile industry, and demonstrated that industry's ability to bear the estimated burden. *See* TAN 145-150 *supra*. The warehousing and classing office industries did not challenge the economic feasibility of the standard as they are already close to compliance, but the agency provided thorough responses to their claims that the standard is unjustified. *See* TAN 197-201 *supra*.

[227] Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

mand this issue for clarification or reconsideration by the agency.[228]

V. Other Challenges

We conclude that the standard withstands the remaining challenges to the standard's implementation period, employee-transfer provision, and use of pulmonary function tables.

A. *The Four-Year Implementation Program*

The standard does not require any employer to complete implementation of engineering or work practice controls until four years after its effective date.[229] The textile industry challenges this time period as too stringent;[230] the union challenges it as too lax.[231] Both groups

---

[228] We do not require the agency to establish the standard's economic feasibility in a particular way. It may pursue its cost-shifting theory or it may demonstrate an alternative estimate for costs or shutdowns, as long as it obtains substantial support from factual and policy materials.

[229] 43 Fed. Reg. 27395 (1979) (§ 1910.1043(e)(3)(g)(iii)). *See also id.* at 27387. The more stringent proposed standard would have required employers to achieve 500 $\mu g/m^3$ immediately, 350 $\mu g/m^3$ in four years, and 200 $\mu g/m^3$ in seven years. *Id.*

[230] Textile Brief at 34-37 (claiming industry-wide compliance with four years not technologically feasible). The textile industry also challenges the six-month period selected by OSHA for intial monitoring of employee health. Textile Brief at 73 (challenging § 1910.1043(m)(2)(i), 43 Fed. Reg. 27398 (1978)). Although testimony was offered in support of a twelve-month period, J.A. 3064-65, 4151, some major industries testified that they already have medical surveillance and dust monitoring programs. J.A. 1987-88, 2035. OSHA's selection of the six-month period reasonably reflected this evidence, and the availability of a variance should assist any employer for whom this provision proves a hardship.

[231] The unions argue that the four-year period will permit unnecessary delay by employers who could comply sooner. They claim that this result would violate OSHA's mandate to

of petitioners claim that the agency's decision lacks support in the record, authorization under the OSH Act, and adequate explanation by the agency.

We find no basis to petitioners' claims. OSHA reasonably set the four-year compliance period to accommodate the competing needs of employers who need time to achieve compliance and the needs of employees who need protection from health risks.[232] The agency decided that to meet the standard's requirements, employers should first monitor employee health, consult with experts, and prepare detailed compliance plans.[233] The four-year period it chose we find will permit orderly, industry-wide compliance.[234] Employers for whom this period is infeasible can seek an administrative variance.[235] The agency still

---

set the standard which most adequately assures, to the extent possible . . . that no employee will suffer material impairment of health or functional capacity." Union Brief at 31 (citing Section 6(b)(5), 29 U.S.C. § 655(b)(5) (1976)). The union claims that OSHA should have required employers to achieve compliance "at the earliest possible time, but no later than" a specified date, as it did in setting permanent standards for arsenic, see 29 C.F.R. § 1910.1018(g), and for coke oven emissions, see 29 C.F.R. § 1910.1029(7)(1)(i)(a).

[232] Besides competing interests, OSHA had to evaluate conflicting estimates of the time necessary for compliance. 43 Fed. Reg. 27385 (1978).

[233] *Id.* at 27383-86; *id.* at 27395 (to be codified at 29 C.F.R. § 1910.1043(e) (1978)).

[234] This manner of implementation is well within the scope of the agency's appropriate concerns. *See* Industrial Union v. Hodgson, 499 F.2d at 479 ("It is appropriate to allow sufficient time to permit an orderly industry-wide transition").

[235] Under § 1910.1043(e)(1) of the standard, the employer must utilize engineering controls and work practices to meet the permissible exposure limits "except to the extent that the employer establishes that such controls are not feasible." 43 Fed. Reg. 27395 (1978). And under § 6(b)(6)(A), (B) of the Act, 29 U.S.C. § 655(b)(6)(A), (B) (1976), an em-

assures protection to workers during the implementation period with the standard's respirator provisions.[236] We cannot disturb the agency's decision simply because petitioners would have struck a different balance between the needs of employers and employees.[237] We find that the four-year period reflects reasoned decisionmaking on the basis of the rulemaking record.

B. *The Medical Transfer and Wage Guarantee Provisions* [238]

The standard includes special provisions for employees who, for medical reasons, cannot wear respirators. Sec-

---

ployer may obtain a temporary variance from the requirements of the standard upon showing that

> (i) he is unable to comply with a standard by its effective date because of unavailability of professional or technical personnel or of materials and equipment needed to come into compliance with the standard or because necessary construction or alteration of facilities cannot be completed by the effective date, (ii) he is taking all available steps to safeguard his employees against the hazards covered by the standard, and (iii) he has an effective program for coming into compliance with the standard as quickly as practicable.

See Industrial Union, 499 F.2d at 479-80.

[236] 43 Fed. Reg. 27384; *id.* at 27396 (§ 1910.1043(f) (1978)). Employers will incur the cost of providing respirators to all exposed employees until compliance with the appropriate PEL is attained. *Id.* at 27385.

[237] *See* Industrial Union v. Hodgson, 499 F.2d at 479.

[238] The union petitioners in this case have not challenged what they consider inadequacy in the medical surveillance provisions in the standard, since OSHA "has expressly represented . . . that [it] will shortly address this matter, in light of the conclusions reached by the agency in the rulemaking proceedings regarding the lead standard." Union Br. at 29, n.80. The union petitioners thus receive two broader questions, neither of which is implicated by the medical transfer

tion 1910.1023(f)(2)(v) provides for the transfer of such employees to positions outside the dusty areas:

> Whenever a physician determines that an employee is unable to wear any form of respirator, . . . the employee shall be given the opportunity to transfer to another position which is available or which later becomes available having a dust level at or below the PEL.[239]

This section also guarantees the wages and benefits of transferred employees:

> The employer shall assure [that] an employee who is transferred due to an inability to wear a respirator suffers no loss of earning or other employment rights or benefits as a result of the transfer.[240]

The textile petitioners argue that this provision exceeds OSHA's statutory authority.[241] We find to the contrary that this provisions falls within the agency's authority to include in its standards such "practices, means, methods, operations, or processes, [that are] reasonably necessary or appropriate to provide safe or healthful employment."[242] OSHA determined that a limited number of employees cannot be protected even temporarily by res-

---

and wage guarantee provisions of the cotton dust standard: (1) should employers be required to take certain personnel actions such as transferring employees to less dusty areas of a plant when medical reports show them to be at increased risk; and (2) should certain employer actions be prohibited, such as firing employees based upon information obtained pursuant to the medical surveillance program. *Id.*

[239] 43 Fed. Reg. 27396 (1978) (§ 1910.1043(f)(2)(v)).

[240] *Id.*

[241] Textile Brief at 67-71.

[242] Section 3(8) of the Act, 29 U.S.C. § 652(8) (1976).

pirators.[243] Absent the medical transfer and wage guarantee provisions, during the interim compliance period these employees would be forced to suffer continuing exposure to impermissibly high dust levels or else risk disadvantageous transfers, or even risk losing their jobs.[244] Given these alternatives, such employees may refrain from disclosing actual health impairments from the dust exposure. OSHA is authorized to guard against such problems. Its mandate is to assure that "*no* employee will suffer material impairment of health or functional capacity" on the job.[245] In light of the Act's purposes,[246] OSHA sought to avoid these problems and properly placed the cost of employee protection on the employer.

---

[243] Due to the high incidence of diminished pulmonary function among existing cotton dust workers OSHA expects that some employees will be found to be incapable of wearing a single use or other form of negative pressure respirators. . . . [C]ertain employees will be incapable of even wearing a PAPR [powered air purifying respirator]. An employee under such circumstances, in the absence of some opportunity to transfer to a position where a respirator need not be worn, might very well be discharged, or otherwise sustain economic loss, due to his or her inability to wear a respirator.

43 Fed. Reg. 27387 (1978).

[244] *Id.*

[245] Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

[246] The Act's overriding purpose is to "assure so far as possible every working man and woman in the nation safe and healthful working conditions." Section 2(b) of the Act, 29 U.S.C. § 651(b) 1979. *See also* Legis. Hist. at 1050-51 (remarks of Sen. Eagleton) (costs of health and safety standards are reasonable and necessary costs of doing business); *id.* at 1051 (remarks of Rep. Broomfield) (workers should not suffer while labor and industry argue);

Employers will be burdened for only a short time by the medical transfer and wage guarantee provisions. Once employers achieve the requisite exposure levels, no employees, to be protected, will need respirators or job transfers. In the meantime, the provisions provide a reasonable incentive for employers to speed compliance efforts. They also sensibly allocate the transfer decision to doctors surveying the individual workers. We find, therefore, that the medical transfer and wage guarantee provisions fall within OSHA's authority to adopt methods reasonably necessary to ensure safe working conditions.[247]

C. *Pulmonary Function Tables*

OSHA included as Appendix C to the standard a set of tables that establishes predicted pulmonary function values as the norm against which employees' actual lung functions are to be measured.[248] Under the standard's medical surveillance provisions, if an employee's actual lung function falls more than twenty percent below the appropriate value specified in these tables, the employee must be retested every six months until the table's values are met.[249]

---

[247] Textile Petitioners also challenge the agency's choice of respirators expressed in § 1910.1043(f)(2), 43 Fed. Reg. 27396 (1978). OSHA points to expert testimony that supports its decision to require the more expensive, reusable respirators. As the record shows that less costly single-use respirators cannot be relied upon at such dust levels, whenever the time-weighted exposure level exceeds five times the prescribed level. J.A. 3604, OSHA's determination is adequately supported.

[248] 43 Fed. Reg. 27414-18 (1978) (based on F. Knudson, *et al., The Maximal Expiratory Flow-Volume Curve,* 113 AM. REV. RESPIRATORY 587 (1976)). *See* 43 Fed. Reg. 27391.

[249] 43 Fed. Reg. 27397 (1978) (§ 1910.1043(h)(2)).

The textile industry asks us to vacate these tables.[250] The industry claims that the tables and the studies on which they are based were not made part of the record and were not available for public comment before the promulgation of the final standard. Further, the industry claims that the tables rely on studies of a sample population that does not share important characteristics with the employees who will be measured against the tables.[251]

We find petitioners' claims unwarranted. This is not an instance of a final standard that contains a provision substantially different from the proposed version.[252] The proposed version contained similar tables and the agency explicitly solicited comments on their use.[253] There

---

[250] Textile Brief at 64-67.

[251] Petitioners assert that "the Knudson tables were determined from the test results of 746 non-Mexican-American, non-smoking residents of Tuscon, Arizona, who were totally free of respiratory symptoms or diseases and had no history of heart trouble . . . . In stark contrast, over half of textile industry employees smoke heavily." Textile Br. at 67 183. (citations omitted). It remains unclear whether petitioners find the sample group unrepresentative beyond the fact that they are non-smokers. In any case, petitioner's challenge on this point must fail. OSHA reasonably selected a medical predictive index of established normal functioning levels that can be used to uniformly measure any and all variations.

[252] *Cf.* National Constructor's Ass'n v. Marshall, 381 F.2d 960, 966-67, 972 (D.C. Cir. 1978) (procedural defect where OSHA rule significantly differs in final form earlier version available to Advisory Committee).

[253] The agency requested comment on "whether . . . pulmonary functions measurement[s] need to be applied differently to different ethnic groups." 41 Fed. Reg. 56498 (1976), J.A. 171 (Statement Accompanying Proposed Standards). OSHA summarized the comments received on this point in the Statement Accompanying the Final Standard at 43 Fed. Reg. 27391 (1978).

is no doubt that the general concept of pulmonary function tables as benchmarks in medical surveillance was thoroughly discussed during the informal rulemaking proceeding.[254]

Petitioners still ask us to vacate the tables finally adopted because their exact form and contents were not available for comment during the rulemaking process. Were we to agree, we would essentially preclude the agency from responding to comments during the rulemaking process,[255] for the tables finally adopted were a logical outgrowth of testimony receiving during the rulemaking proceeding.[256] The sample population employed

---

[254] *See, e.g.*, J.A. 1225-26 (Statement of Grover Wrenn); J.A. 1413-14 (Statement of Hans Weill); J.A. 1561-62 (Merchant Study); J.A. 3346-47 (posthearing comments of textile industry); J.A. 3463-64 (posthearing comments of textile workers union).

[255] *See* South Terminal Corp. v. EPA, 504 F.2d 646, 659 (1st Cir. 1974). Similarly,

> As we have previously held, the requirement of submission of a proposed rule for comment does not automatically generate a new opportunity for comment merely because the rule promulgated by the agency differs from the rule it proposed partly at least in response to submissions.[51]
>
> [51] A contrary rule would lead to the absurdity that in rulemaking under the APA the agency can learn from the comments on its proposals only at the peril of starting a new procedural round of commentary. [footnote in original].

International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 632 & 632 n.51.

[256] The Knudson tables, adopted in the final standard, followed guidelines for measuring pulmonary function that were endorsed by both industry and OSHA representatives during the rulemaking proceedings. *See* J.A. 3349; 43 Fed. Reg. 27418 (1978) (Appendix D) (minimum standards for pulmonary functioning measurements).

improve the scientific reliability of these tables when compared with those used in the proposed standard.[257] Thus, we find the adoption of these tables consistent with the requirements of informal rulemaking and with the agency's duty to base the standard on the "best available evidence." [258]

CONCLUSION

Our task on review has not been easy. The record is massive and unwieldy; [259] it reveals numerous medical and technical issues in need of continued study. Congress, however, has made it clear that OSHA must protect every worker from the risks of material health impairment due to occupational exposure to hazardous materials. OSHA

---

[257] See 43 Fed. Reg. 27391 (1978). The Knudson tables were based on studies of males and females. The tables used in the proposed standard instead used data from 15 years earlier on only male subjects and relied on estimates to derive a full range of values. *Id.*

[258] *See* Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

[259] As a constructive criticism, we offer one further observation. Although the agency amassed an impressive array of experts and assembled comments from workers, employers, scientists, and economists, the agency did not present the evidence in a fashion easily amenable to review.

Our review function would have been greatly facilitated if OSHA had organized the material in the rulemaking record in some logical fashion. A more systematic identification of the topics of different pieces of testimony, the comments that pertain to particular studies, and the questions that remained unanswered by the proceedings would have eased our task on review and also presented the agency's case more forcefully.

Thus, although we are satisfied that the agency met its burden on review except for the application of the standard to the cottonseed oil industry, we reach that conclusion only after a tedious and at times frustrating review of the record.

is constrained only by the requirement that its standards be technologically and economically feasible for the regulated industries. In sum, our review leads us to uphold the standard, except for its application to the cottonseed oil industry. In every aspect except that one, OSHA explained the evidence in the record it found persuasive and the policies that guided its judgment when facts proved insufficient. As for the cottonseed oil industry, however, we are unable to discern the basis for the agency's feasibility determination. We do not conclude that the standard is infeasibile for that industry; rather, we remand that portion for reconsideration or clarification by the agency.

Ordinarily, we would remove the stay of the standard that was granted for the pendency of this litigation. In view of the alleged magnitude of the consequences, however, we will defer action regarding the stay to afford petitioners 20 days to show cause why the stay should not be lifted.

It is so ordered.

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

Filed January 11, 1980

No. 78-1562 September Term, 1979

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, ET AL.,

Petitioners

V.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.,

Respondents

And Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016, and 78-2018.

BEFORE: Bazelon, Senior Circuit Judge; Tamm and Robinson, Circuit Judges

ORDER

Upon consideration of the petitions for rehearing submitted by the various parties, it is

ORDERED, by the Court, that the aforesaid petitions for rehearing are denied.

Per Curiam
For the Court:

George A. Fisher, Clerk

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

Filed January 11, 1980

No. 78-1562 September Term, 1979

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, ET AL.,

Petitioners

V.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.,

Respondents

And Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987. 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016, and 78-2018.

BEFORE: Wright, Chief Judge; McGowan, Tamm, Robinson, MacKinnon, Robb, Wilkey, Wald and Mikva, Circuit Judges

ORDER

Suggestions for rehearing *en banc* submitted by various parties to these proceedings, having been transmitted to the full Court and no judge in regular active service having requested a vote with respect thereto, it is

ORDERED, by the Court, *en banc*, that all suggestions for rehearing *en banc* are denied.

Per Curiam

For the Court:
George A. Fisher, Clerk

Statement of Circuit Judge MacKinnon:

The Supreme Court in October heard oral argument in *Marshall* v. *American Petroleum Institute*, No. 78-1036, on the question whether a cost benefit analysis was required in a relatively comparable case. Judge MacKinnon would defer *en banc* consideration of this opinion until the Supreme Court issues its opinion in *Marshall* v. *American Petroleum Institute*.

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

Filed January 22, 1980

No. 78-1562 September Term, 1979

AMERICAN FEDERATION OF LABOR &
CONGRESS OF INDUSTRIAL ORGANIZATIONS,
Petitioner

v.

RAY MARSHALL, SECRETARY OF LABOR,
UNITED STATES DEPARTMENT OF LABOR,
ET AL.,
Respondent

And Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016 and 78-2018

BEFORE: Bazelon, Senior Circuit Judge; Tamm and Robinson, Circuit Judges

ORDER

Upon consideration of the motions of petitioners National Cotton Council of America, Cotton Warehouse Associations, et al and American Textile Manufacturers Institute, Inc., et al for stay of the issuance of the mandate, and of the responses thereto filed by respondents and by petitioner unions, it is

ORDERED, by the Court, that the aforementioned motions to stay issuance of the mandate in the captioned case,

and in all of the cases consolidated therewith, except for Appeal No. 78-2014, are denied and the Clerk is directed to issue the mandate forthwith in all of the above-referenced cases, excepting only Appeal No. 78-2014. Provisions relating to the stay of the standard for exposure to cotton dust and to the effective date of that standard, as set forth in an order of the Court filed January 11, 1980, are not affected by the instant order.

Per Curiam
For the Court:

George A. Fisher, Clerk

Circuit Judge Tamm voted to stay issuance of the mandate for 30 days.

Exhibit 6, No. 18

BYSSINOSIS

A Study of 10,133 Textile Workers

Harold R. Imbus, MD, ScD, and
Moon W. Suh, PhD, Greensboro, NC

All charts at end of article

A respiratory screening program, including the administration of a questionnaire and pulmonary function tests, including one-second forced expiratory volume (FEV_1), and forced vital capacity (FVC), was carried out on employees working in cotton textile plants. This identified employees with byssinosis and other pulmonary conditions. The results revealed a marked relationship between the incidence of byssinosis and bronchitis and between byssinosis and lowered pulmonary function. Cigarette smoking appeared to further increase the incidence of bronchitis and lower pulmonary function. A drop in FEV_1 during the working day, though associated with, was often present without byssinosis symptoms. A combined program of dust control with medical evaluation and surveillance is practical. Identification of reactors to cotton dust and those with other pulmonary conditions enables the employer to lessen risk by localization of areas in need of improved environmental control and by selective placement of employees.

In 1970, Duke University and the North Carolina State Board of Health cooperated with Burlington Industries in

Submitted for publication June 20, 1972; accepted Oct. 31.

From the Medical Department, Burlington Industries, Inc., Greensboro, NC.

Reprint requests to Burlington Industries, Inc., Medical Department, 3330 W. Friendly Ave., Greensboro, NC 27420. (Dr. Imbus).

a study of byssinosis to determine prevalence and control measures, and to evaluate various dust sampling techniques. Preliminary results of these studies have been presented by Merchant[1] and Lumsden.[2] As a result of their findings and recommendations a cooperative study in environmental control possibilities was embarked upon, and a corporate-wide preventive medical control program aimed at identifying and evaluating those persons with all forms of chronic lung disease was started. The results of the surveys initiated in the medical control program are presented in this paper.

Altogether 10,133 employees of Burlington Industries in 19 plants participated in the initial survey of the project. The selected plants process raw cotton in the manufacture of yarn. All employees, including unexposed employees, were invited to participate in those plants included in the program. Though participation was voluntary, over 95% of employees took part. Though the primary purpose of the project was to institute a preventive program, the large number of employees screened provided enough data for a unique opportunity to evaluate a number of interesting relationships. Some of these are presented below.

Method

The medical study program consisted of the following:

Respiratory Questionnaire.—The British Medical Research Council Respiratory Questionnaire modified by Schilling, Merchant, and Kilburn was administered to each employee participating in the study. This consists of 115 questions designed to highlight the existence of clinical bronchitis or byssinosis or both in addition to allergy, smoking history, and work history, especially including years of work with cotton.

Pulmonary Function.—Forced vital capacity (FVC) and

one-second forced expiratory volume (FEV_1), before the beginning of the work shift on the first day of the work week and repeated approximately six hours into the work shift were obtained on each employee. Follow-up pulmonary function studies, physician interview, chest x-ray films, and detailed clinical studies followed if indicated by questionnaire or abnormal test results. On new employees, initial base line FEV_1, FVC, and questionnaire results were obtained and were again obtained within six weeks of employment.

A minimum of four forced exhalations were obtained from each subject during each testing. The instrument used was a waterless spirometer (Jones Pulmonor II) set on 1 in/sec speed. Graphs were read by trained technicians. The highest two FEV_1 and FVC findings were averaged and represented the observed FEV_1 and FVC for each individual.

Calculations were made for each of the following:

$$\text{Predicted } FEV_1{}^{3} \text{ (and unpublished data)} = FEV_1\,(P)$$

$$\text{Percent of predicted } FEV_1 = \frac{FEV_1 \text{ observed}}{FEV_1\,(P)} \times 100 = FEV_1\,(P)\,\%$$

$$\text{Change in } FEV_1 = FEV_1 \text{ after six hours work} - FEV_1 \text{ before work} = \triangle FEV_1$$

$$\text{Percent change in } FEV_1 = \frac{\triangle FEV_1}{FEV_1 \text{ before work}} \times 100 = \%\ \triangle FEV_1$$

Data Processing.—Byssinosis was graded according to the classification of Schilling[4] as follows: grade 1/2, occasional chest tightness or cough on the first day of the work week; grade 1, chest tightness on every first day of the work week; grade 2, chest tightness on the first and other days of the working week.

Since our analyses relate byssinosis symptoms (all grades) to pulmonary function findings, grade 3 (which is grade 2 symptoms accompanied by evidence of permanent

respiratory impairment) is omitted from the following tables.

Chronic bronchitis was defined and graded as follows: grade 0, no evidence of the production of sputum from the chest of such frequency as graded below; grade 1, simple chronic bronchitis. Evidence of the production of sputum from the chest first thing in the morning—or upon rising, on most days for a period of at least three months each year for at least the past two years, and the absence of an exacerbation as defined below; grade II, chronic bronchitis with an exacerbation. Evidence of the presence of sputum as defined in grade 1 above together with one or more periods of increased production of sputum lasting three weeks or more within the past three years, or, one or more chest illnesses with an increased production of sputum causing an absence from work for at least one week during the past three years.

Smokers are defined as those who now smoke or have smoked one cigarette or more per day for as long as one year, exclusive of pipe smokers. All data from questionnaire and pulmonary function measurements were keypunched and processed by computer. A printout for each subject was obtained including such data as byssinosis and bronchitis grade, pulmonary function measurements, area of work, change in FEV_1, etc.

A team of four nurses, a physician's assistant, and plant nurses in each involved plant were trained in the interview technique and in the interpretation of the pulmonary function measurements in a one-day seminar. During the surveys, those trained also received several hours of personal supervision on-site during the surveys by the medical director or the chief nurse, until proficiency was demonstrated. The medical director or chief nurse or both visited

each plant during the time of its survey and personally observed each team member in the performance of interview and pulmonary function testing in order to reduce observer variation.

Recommendations were made to management and employees for suitable work change where indicated. A yearly retesting program has been instituted.

Results

Due to practical considerations, a number of employees working in relatively nondusty areas was tested only before the work shift; this left a total of 8,025 of the 10,133 employees who participated in both sets of pulmonary function tests. Results of questionnaire data, including subjective byssinosis symptoms, bronchitis, and smoking history, are based upon the larger number, whereas activities necessitating before and after pulmonary function tests are based upon the smaller number. Results necessitating only single pulmonary function determination, eg, percent predicted FEV_1, are based upon the number of observations available for that determination. A summary of results is shown in Table 1. The incidence of byssinosis (all grades) by length of employment is shown in Table 2. Table 2 shows males tend to have a higher incidence the longer employed, whereas females vary little with length of employment. Tables 3 and 4 show incidence of byssinosis and bronchitis by age, sex, and smoking habits. Further analysis to separate the effect of smoking and length of employment was not considered feasible due to the small number of individuals who would be present in each of the multiple cells required for this analysis.

Byssinosis by Work Area.—Our findings (Fig. 1) as expected revealed the highest incidence of byssinosis in

preparation areas (opening, blending, picking, carding, drawing, combing, roving) with a much lower incidence in other areas (spinning, winding, twisting, spooling, slashing, weaving, and miscellaneous areas). The very low incidence in areas other than preparation is possibly due to the better grade of cotton and high percentage of synthetic mixture used in most of the plants surveyed.

Byssinosis, Bronchitis, and Smoking.—In order to determine the degree of association, if any, between byssinosis and bronchitis, the total population was partitioned into combinations of byssinosis grades (0, 1/2, 1, 2) and bronchitis grades (0, 1, 2). Based on the number of observations in each cell and the marginal total for each grade, tests were made to see if the two diseases occur independently of each other. The same tests were also made after combining the disease grades greater than zero.

Tables 5 and 6 show the observed values and the expected value obtained under the independency assumption for male and female populations, respectively. It can be seen from these tables that there is a strong association between occurrence of byssinosis and bronchitis with higher grades of byssinosis associated with increasing incidence of bronchitis, and vice versa. Males who smoke have a significantly higher incidence of byssinosis than those who don't, whereas there is no difference between females who smoke and those who don't as seen in the following data:

	Male		Female	
P (BY/NS)	= 3.7%	s	3.1%	ns
P (BY/S)	= 6.2%		2.9%	

where s = the difference is statistically "significant" at 5% error level. ns = the difference is statistically "not significant" at 5% error level. BY=byssinotic. S=smoking. NS=nonsmoking. P (BY/NS)= percentage of byssi-

notics (grades 1/2, 1, or 2) among nonsmokers disregarding bronchitis status. P (BY/S)=percentage of byssinotics among smokers.
The reason for this is unclear.

The relative incidence of bronchitis among those with and without byssinosis was as follows:

	Male		Female	
P (BR/NBY.NS)	5.3%	s	3.9%	s
P (BR/NBY.S)	12.5%		7.5%	
P (BR/BY.NS)	33.3%	s	18.3%	s
P (BR/BY.S)	41.9%		36.7%	

where s = the difference is statistically significant at 5% error level. BR = bronchitis. P (BR/NBY.NS) = percentage of bronchitics among nonbyssinotic nonsmokers. P (BR/NBY.S)=percentage of bronchitics among nonbyssinotic smokers. P (BR/BY.NS)=percentage of bronchitics among byssinotic nonsmokers. P (BR/BY.S) = percentage of bronchitics among byssinotic smokers.

Byssinosis clearly is associated with clinical chronic bronchitis and smoking is clearly associated with increased incidence of bronchitis among byssinotics and nonbyssinotics. Further analysis (not shown) revealed a definite positive association between the incidence of byssinosis, bronchitis, and the number of packs of cigarettes smoked per year.

Byssinosis, Bronchitis-Predicted Pulmonary Function.—Each employee's percentages of predicted FEV_1 and FVC were calculated. These were averaged for various categories: age, sex, and department in the plant; as well as for byssinotics, nonbyssinotics, bronchitics, and nonbronchitics in smoking and nonsmoking males and females. Table 7 shows the averages of the predicted values of FEV_1 for smokers and nonsmokers with and without byssinosis and bronchitis. It is seen from the table that nonbyssinotic, non-

bronchitic, nonsmokers had the highest average predicted FEV_1 in both male and female categories. Among nonsmokers, a mild though definite decrease is noted in those who have bronchitis without byssinosis, a more marked decrease in those with byssinosis without bronchitis, and in males the lowest value is obtained for byssinotics with bronchitis. In females, the slightly higher value of byssinosis with bronchitis may be spurious due to the small sample size. Corresponding similar decreases are noted for smokers with the exception that there is very little difference between nonbyssinotic bronchitics, and byssinotic nonbronchitics among the male smokers, possibly due to compound effects of smoking and the two diseases. Smokers, however, are significantly lower in every category with the exception of nonbronchitic, byssinotic females. Figure 2 illustrates the lowering of FEV_1 (P)% for bronchitics, byssinotics, and combined conditions, and the additional lowering from smoking as compared with base line values of nonbronchitic, nonbyssinotic nonsmokers. These differences were estimated by using the least squares method based on a linear additive statistical model in which the effects of sex, smoking, byssinosis, and bronchitics are properly represented. Table 8 reveals the average percentage of predicted FVC determinations for the corresponding categories. Though similar associations are noted in some cases, FVC predicted values are much more nearly normal and less likely to fluctuate according to the categories, indicating that pathological changes observed here are more likely to affect flow rate rather than vital capacity.

Of interest is the fact that the predicted values for FEV_1 and FVC never average 100% which theoretically they should in a normal population. Control studies on employees unexposed to cotton dust revealed no employee groups

averaged much higher than 90% of predicted values. A combination of several factors may explain this phenomenon: (1) No attempt was made to remove unsatisfactory graphs of poor performers. (2) Employees with all types of pulmonary disease plus cardiovascular disease were included; thus an employee listed as nonbronchitic, nonbyssinotic may have other diseases resulting in abnormally low results. (3) To facilitate testing, the height of employees—except for women in high heels—was measured with shoes on, thus resulting in a slight overprediction. (4) There is evidence from data of asymptomatic nonsmoking employees that present prediction formulae tend to overpredict for some age groups. Regression formulae developed from asymptomatic employees revealed considerably lower predicted values than would be expected from the Veterans Administration cooperative study.

Average percentage of predicted FEV_1 was determined in relation to length of employment in cotton mills. Figure 3 reveals that FEV_1 (P)% does not tend to decrease with increased length of employment in nonsmoking, nonbyssinotic males, whereas in nonsmoking byssinotic males it begins to drop off sharply after about 18 years of employment. Nonbyssinotic smokers always have a lower FEV_1 which tends to become increasingly lower with time. The values for smoking byssinotics are much lower than those for nonsmoking byssinotics for approximately 20 years; then the difference narrows.

There is a gradual drop of pulmonary function in nonbyssinotic, nonsmoking females (Fig. 4), which may be related to the tendency of current prediction formulae to overpredict with older females. There would have been no age effect had the formulae been obtained without bias.

The pulmonary function of byssinotic female smokers

and nonsmokers tends to be lower than that of nonbyssinotics even in the beginning of their employment. The reason for this is not understood since byssinosis would be expected to take years to produce respiratory impairment. The rather small number of byssinotic females makes trends much more difficult to distinguish. However, it is interesting to conjecture as follows: Females are generally exposed to lower concentrations of dust than males because their jobs more frequently place them in less dusty areas like spinning, winding, and weaving while the more dusty opening, picking, and carding jobs are largely staffed by males. Perhaps those males with diminished pulmonary reserve at the time of employment select themselves out rather quickly upon developing byssinosis because of obvious relationship to work. Symptoms in females frequently appeared to be much milder, more subtle, and less obviously related to work, making it less likely that those with preexisting disease would leave. The observation that of female byssinotics 72% are in grade 1/2, and 28% are in grades 1 and 2, while of males 57% are in grade 1/2 and 43% in grades 1 and 2 tends to support this conjecture.

Figures 3 and 4 clearly show that smoking employees, byssinotic employees, and smoking, byssinotic employees in the order mentioned are at increasing risk of developing respiratory impairment, as compared with nonsmoking, nonbyssinotic employees. However, the question arises, are those exposed to cotton dust without byssinosis also at some degree of risk of developing impairment over a number of years of exposure? In order to answer this question, it would be necessary to compute FEV_1 (P)% by length of employment for the above categories for several levels of dustiness. Even with the large number included in this study, a breakdown into so many categories would not yield

large enough numbers per category to provide meaningful results.

Byssinosis and Change in Δ FEV_1.—Much interest has been shown recently in obtaining FEV_1 and FVC before and during the work shift as a measure of reactivity to cotton dust. Bouhuys et al[5] proposed functional classification of byssinosis based upon FEV_1 change after working. It is seen (Table 9) that both bronchitis without byssinosis and byssinosis without bronchitis produce decrement of FEV_1 during the working day, with byssinosis generally producing a larger decrement, especially in males. A combination of both conditions, however, results in the greatest decrement. There is lack of association of cigarette smoking with decrement during the working day as Zuskin et al[6] also reported. In order to better examine the possible effect of smoking, all FEV_1 data were adjusted with use of the prediction formula to bases of males and females aged 40, thus enabling us to deal with absolute decrement in cubic centimeters instead of percentages. No adjustment was made for height due to insignificant differences among the group averages. Figures 5 and 6 show the average values of the adjusted FEV_1 readings before and during work. It is apparent that smoking has very little effect upon decrement but that all readings are significantly decreased in smokers. Based on the group averages, byssinosis does not appear to produce greater decrements than bronchitis but the combination of both conditions produces the greatest. Obviously, the decrement is valuable in determining reactivity, but the clinical and prognostic significance of the decrement as it occurs in an individual without symptoms of byssinosis is open to speculation. One might ask, does the reactivity produce chronic lung disease or does reactivity result from it? Certainly more detailed studies would be necessary to

clarify this point. It should be pointed out in Fig. 5 and 6 that the age adjustment was carried out by use of the linear correction terms for age given in the Veterans Administration prediction formulae[7] (and unpublished data). Since the adjustment factors are linear, neither the FEV_1 decrements (slopes) after work nor the gaps between smokers and nonsmokers will be affected by selecting a base age different from 40. It will simply shift the entire graph upward or downward to provide the group averages corresponding to the new base age.

Those with a decrement of greater than 10% with and without symptomatic byssinosis had lower than average percentage predicted FEV_1 (Table 10). Those with combinations of byssinosis symptoms and decrement greater than 10% were lowest of all. Of interest is the observation that only approximately 25% of byssinotics showed a decrement of 10% or more, whereas only approximately 7% of those with decrements of 10% had byssinotic symptoms. Similar comparisons were made based on 15%, 20%, and 25% decreases in FEV_1 but the probabilities of correct discrimination did not improve significantly. The clinical and prognostic significance of FEV_1 findings needs further study.

The % Δ FEV_1 by work area was as follows: preparation, 3.9%; yarn production, 1.5%; slashing/weaving, 1.5%; and miscellaneous, 1.0%. As expected, greater decrements in FEV_1 are associated with the more dusty areas.

Comment

This screening program involving 10,133 employees has revealed that such programs are practical and effective in identifying byssinotic employees and those with pulmonary impairment. These findings are in agreement with those of

others; there is a high association between the incidence of byssinosis and bronchitis[8], and both conditions are associated with lower pulmonary function.[9,10] Smoking is associated with an additional increased incidence of bronchitis and further impairment of pulmonary function. This study reveals no evidence that nonbyssinotic, nonsmoking males show any deterioration of pulmonary function during prolonged work in cotton plants nor does it prove that they don't. The picture is less clear in females, who show a gradual decrease in percentage of predicted pulmonary function. This may be due to overprediction for the older age groups. Decrement of FEV_1 during the working day is associated with byssinosis, but also with bronchitis, and perhaps other pulmonary disease, and appears to be nonspecific for byssinosis, since only a small percentage of those showing this decrement also have symptoms of byssinosis. Smoking, although associated with lower overall FEV_1, was not associated with greater decrements of FEV_1 during the working day.

Of particular interest is the relatively small number of individuals who have both byssinotic symptoms and decrement in FEV_1 during the working day. Bouhuys et al have proposed a functional grading system[10] which is the basis for a scheme of work assignment developed later.[11] We found considerable numbers of employees exhibiting decrement in FEV_1 without either evidence of symptoms or respiratory impairment. Therefore, care should be exercised in assuming that any one individual exhibiting this phenomenon is at risk. On the other hand, the fact that the group with the decrement have lower percent of predicted FEV_1 indicates that this reactivity may result in or result from pulmonary impairment. Therefore, this group deserves close surveillance and placement in as low a dust exposure as is practical.

Management and employee acceptance of this program was excellent. Of particular value in obtaining cooperation were thorough explanations to these groups of the nature and benefits of the program. Logistics of scheduling and testing large numbers of employees before and during shift, while the plant is at full production, are complex; however, these activities proceeded very smoothly due to detailed planning in each plant. Details of planning, interviewing, and testing are described elsewhere.[12]

Dust samples were obtained with a vertical Lynch Lumsden elutriator cotton dust sampler[13] during screening in each plant. Linear correlations between dustiness, incidence of byssinosis, and decrement in FEV_1 were apparent. Since only identification of relative dustiness was the purpose and since certain practical considerations dictated relatively small numbers of dust samples in each area, these data are not presented.

Screening programs are only as good as the follow-up of positive results. Those showing significant decrement in FEV_1 and an abnormally low FEV_1, according to criteria proposed by the organizing committee, National Conference on Cotton Dust and Health,[11] had pulmonary function measurements repeated. Persons who presented positive results and those with symptoms of byssinosis were interviewed by the author, after which recommendations for placement or for comprehensive medical evaluation were made. Physicians knowledgeable in byssinosis performed a complete medical evaluation, including detailed ventilatory studies and measurement of arterial blood gas levels. Recommendations based on results of these studies were given to employees, employees' physicians, and management and where necessary the employee was transferred to work involving minimal dust exposure.

Medical surveillance programs of this type are only an

adjunct to, not a substitute for, environmental controls. Burlington Industries, Inc. is involved in a number of environmental control programs, including installation of exhaust systems, close coordination with machinery manufacturers, and cooperative research with Duke University and the North Carolina State Board of Health in development of pretreatment of cotton to reduce offending agents. A continuing program of environmental monitoring is being planned. Even so, it is generally agreed that any currently proposed methods of environmental control will not be completely effective. Therefore, the need for medical surveillance will probably continue for some time.

In spite of rapidly increasing interest, research, and considerable progress in recent years, knowledge of byssinosis is still very incomplete. It is our hope that programs, like that outlined above, may contribute to that knowledge, but even more important, provide protection to employees until complete control is available.

The British Medical Research Council Respiratory Questionnaire as modified by Schilling et al may be obtained from ASIS, National Auxiliary Publications Service, c/o CCMC Information Corp. 866 Third Ave. New York 10022.

REFERENCES

1. Merchant JA: Byssinosis prevalance. Read before the American Industrial Health Conference. Atlanta. 1971.

2. Lumsden JC: Environmental aspects of byssinosis. Read before the American Industrial Health Conference. Atlanta. 1971.

3. Boren HC. Kory RC, Snyder JC: The Veterans Administration cooperative study of pulmonary function: II. The lung volume and its subdivisions in normal men. *Am J Med* 41:96-114. 1966.

4. Schilling RSF, et al: A report on a conference on byssinosis. *Proc XIV Int Congr Occup Health, Madrid* 2:137-145, 1963. Exercpta Medica, Amsterdam.

5. Bouhuys A. et al: Byssinosis in hemp workers. *Arch Environ Health* 14:533-544, 1967.

6. Zuskin E. et al: Byssinosis in carding and spinning workers. *Arch Environ Health* 19:666-673, 1969.

7. Merchant JA, et al: Byssinosis and chronic bronchitis among cotton textile workers. *Am Int Med* 76:423-433, 1972.

8. Elwood DC, et al: Byssinosis and other respiratory symptoms in flax workers in Northern Ireland. *Br J Ind Med* 27:37, 1965.

9. Bouhuys A, et al: Byssinosis in the United States. *N Engl J Med* 17:170-175. 1967.

10. Valic, et al: Byssinosis, chronic bronchitis, and ventilatory capacities in workers exposed to soft hemp dust. *Br J Med* 25:176-186, 1968.

11. The status of byssinosis in the United States: A summary of the National Conference on Cotton Dust and Health and the recommendation of the organizing committee. *Arch Environ Health,* 23: 230-234, 1971.

12. Murphy AJ: A respiratory screening and surveillance program in a textile industry. Occup Health Nurs 20:12-15, 1972.

13. Lynch JR: Air sampling for cotton dust, in *Transactions of the National Conference of Cotton Dust and Health.* Chapel Hill, NC, University of North Carolina, 1970.

Table 1.—Byssinosis Survey	
Total employees surveyed (questionnaire)	10,133
Males	60.0%
Females	40.0%
Byssinosis (all grades)	4.6%
Males	5.7%
Females	3.0%
Bronchitis	9.8%
Males	12.6%
Females	6.0%
Smokers	64.0%
Males, smokers	78.0%
Females, smokers	43.0%
Total employees surveyed (questionnaire plus before and after pulmonary function)	8,206

Table 2.—Prevalence (%) of Byssinosis According to Length of Employment

	Length of Employment (Years) in Cotton Mills					
	0-8	8-16	16-24	24-32	32-40	40-48
Male	4.1	5.9	8.5	7.6	6.6	8.1
Female	3.1	3.1	3.4	3.4	1.9	2.1

Table 3.—Byssinosis Prevalence (%) for Different Age Groups and Smoking Habit

	Age Groups				
	Less Than 30	30-39	40-49	50 and Over	Total
Male					
Nonsmokers	2.5	3.0	5.9	5.2	3.7
Smokers	4.6	4.2	7.5	8.0	6.2
Combined total	3.9	4.0	7.2	7.5	5.7
Female					
Nonsmokers	2.9	3.8	2.7	3.2	3.1
Smokers	2.5	2.6	4.7	1.4	2.9
Combined total	2.7	3.2	3.6	2.7	3.0

Table 4.—Bronchitis Prevalence (%) for Different Age Groups and Smoking Habit

	Age Groups				
	Less Than 30	30-39	40-49	50 and Over	Total
Male					
Nonsmokers	4.9	4.7	9.1	8.4	6.3
Smokers	11.2	14.2	14.4	17.0	14.3
Combined total	9.2	12.3	13.6	15.4	12.6
Female					
Nonsmokers	3.1	4.1	4.4	5.1	4.3
Smokers	6.6	9.1	10.0	7.5	8.3
Combined total	4.7	6.6	6.9	5.8	6.0

Table 5.—Byssinosis vs Bronchitis in Men*

Bronchitis	Grades	Byssinosis 0	1/2	1	2	Total
	0	5,035 (4,933)	114 (153)	63 (93)	24 (51)	5,236
	1	419 (472)	33 (14)	24 (9)	18 (5)	500
	2	195 (238)	22 (7)	19 (5)	16 (2)	252
	Total	5,649	175	106	58	5,988

Bronchitis	Grades	Byssinosis 0	1/2+1+2	Total
	0	5,035 (4,933)	201 (297)	5,236 = 87.4%
	1+2	614 (710)	138 (42)	752 = 12.6%
	Total	5,649 = 94.3%	339 = 5.7%	5,988 = 100%

*Parenthetical numbers = expected values, ie, obtained under the assumption that the two diseases are occurring independently of each other.

Table 6.—Byssinosis vs Bronchitis in Women*

Bronchitis	Grades	Byssinosis 0	1/2	1	2	Total
	0	3,636 (3,612)	64 (76)	18 (26)	7 (11)	3,725
	1	110 (120)	10 (3)	3 (1)	1 (0)	124
	2	98 (112)	7 (2)	6 (1)	4 (0)	115
	Total	3,844	81	27	12	3,964

Bronchitis	Grades	Byssinosis 0	1/2+1+2	Total
	0	3,636 (3,612)	89 (113)	3,725 = 94.0%
	1+2	208 (232)	31 (7)	239 = 6.0%
	Total	3,844 = 97.0%	120 = 3.0%	3,964 = 100%

*See Table 5 footnote.

Table 7.—Average Percentage of Predicted FEV, in Smokers and Nonsmokers With and Without Byssinosis and Bronchitis

		Average % of Predicted FEV, Nonbyssinotic	Sample Size, Byssinotic
Male nonsmoker	Nonbronchitics	82.4 (993)	84.5 (28)
	Bronchitics	83.2 (50)	80.1 (16)
Male smoker	Nonbronchitics	85.9 (3,172)	81.5 (157)
	Bronchitics	81.2 (434)	73.7 (100)
Female nonsmoker	Nonbronchitics	85.7 (1,720)	76.6 (47)
	Bronchitics	82.9 (68)	78.4 (11)
Female smoker	Nonbronchitics	82.6 (1,213)	77.0 (30)
	Bronchitics	81.3 (93)	73.5 (15)

Table 8.—Average Percentage of Predicted FVC in Smokers and Nonsmokers With and Without Byssinosis and Bronchitis

		Average % of Predicted FVC, Nonbyssinotic	Sample Size, Byssinotic
Male nonsmoker	Nonbronchitic	91.7 (993)	99.9 (28)
	Bronchitic	93.4 (59)	85.4 (15)
Male smoker	Nonbronchitic	91.5 (3,172)	90.2 (157)
	Bronchitic	88.7 (484)	83.5 (109)
Female nonsmoker	Nonbronchitic	94.0 (1,729)	85.1 (47)
	Bronchitic	93.1 (68)	90.8 (11)
Female smoker	Nonbronchitic	93.4 (1,213)	87.1 (30)
	Bronchitic	95.4 (93)	87.7 (15)

Table 9.—Observed Percent Change in FEV in Smokers and Nonsmokers With and Without Byssinosis and Bronchitis

		Percent Change in FEV$_1$, Nonbyssinotic	Sample Size, Byssinotic
Male nonsmoker	Nonbronchitic	−0.3 (993)	−5.2 (28)
	Bronchitic	−3.8 (59)	−11.1 (15)
Male smoker	Nonbronchitic	−1.3 (3,157)	−4.7 (157)
	Bronchitic	−0.5 (484)	−6.9 (109)
Female nonsmoker	Nonbronchitic	0.4 (1,729)	−3.2 (47)
	Bronchitic	−3.3 (68)	−6.0 (11)
Female smoker	Nonbronchitic	−2.7 (1,213)	−3.1 (30)
	Bronchitic	−1.5 (93)	−2.9 (15)

Table 10.—Average Percent of Predicted FEV$_1$ vs Byssinosis and Decrement in FEV$_1$

	Percent Drop <10%		Percent Drop >10%	
	No. Observed	Av % Predicted FEV	No. Observed	Av % Predicted FEV$_1$
Nonbyssinotic	(6,410)	86.4	(1,384)	82.3
Byssinotic (all grades)	(302)	81.1	(110)	71.3

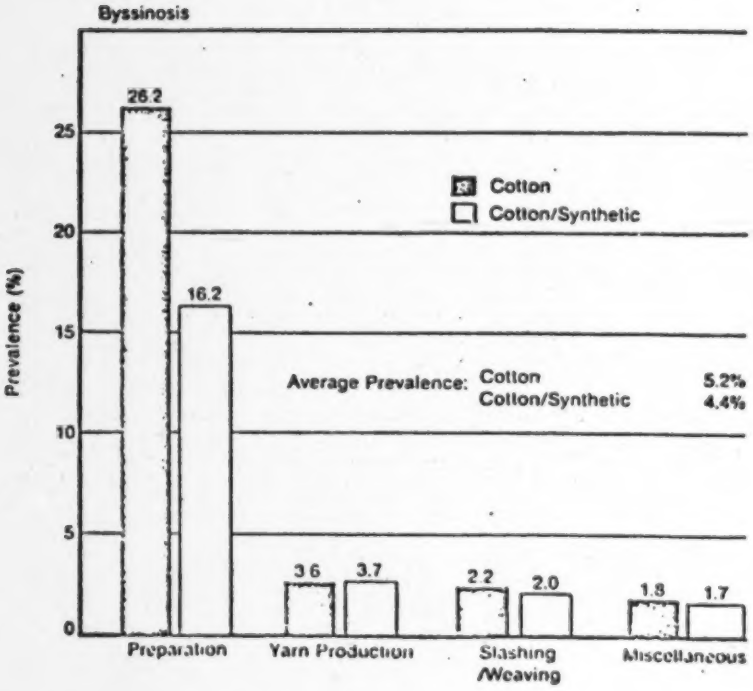


Fig. 1—Byssinosis prevalence by work area and raw material use.

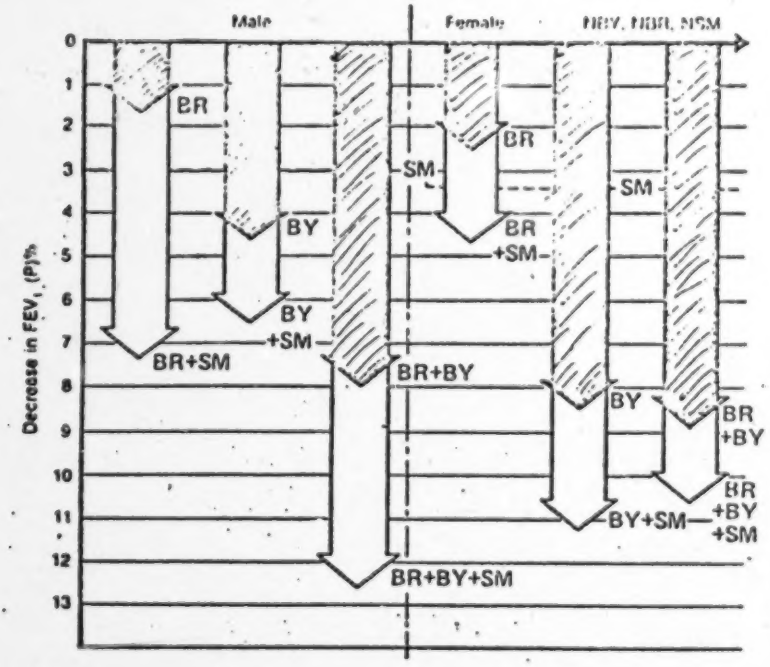


Fig. 2—Lower FEV_1 (P) % associated with byssinosis, bronchitis, and smoking in comparison to FEV_1 (P) % of nonbyssinotic, nonbronchiac nonsmokers.

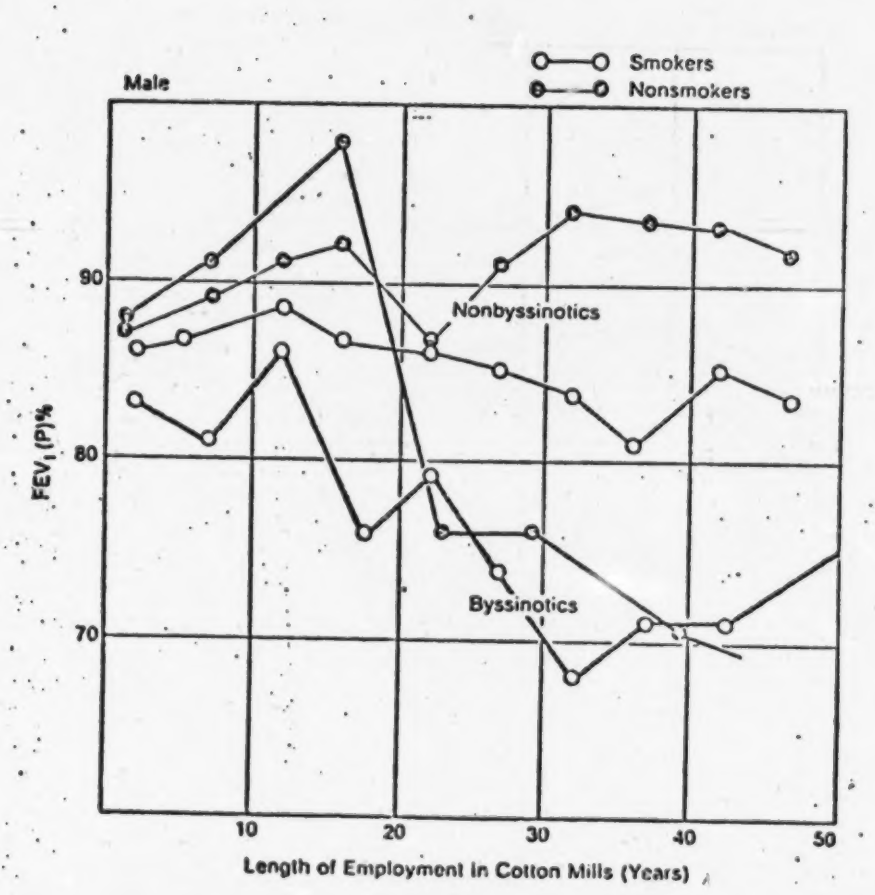


Fig. 3—Relationship between length of employment in cotton mills and average percentage of predicted FEV_1 in reference to byssinosis and smoking in men.

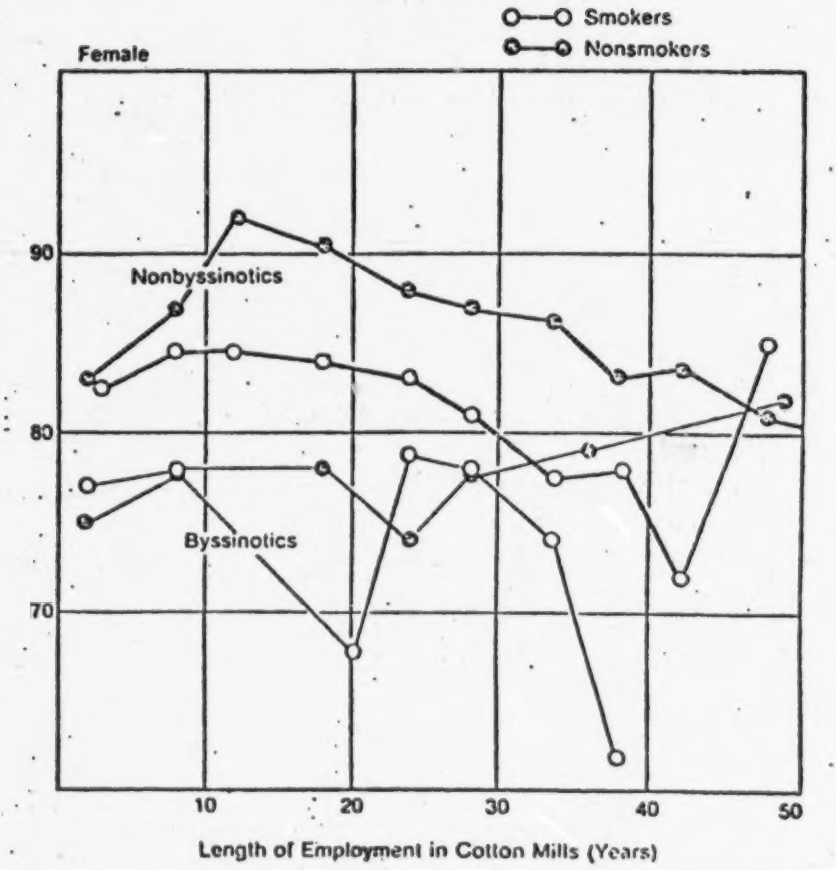


Fig. 4—Relationship between length of employment in cotton mills and average percentage of predicted FEV_1 in reference to byssinosis and smoking in women.

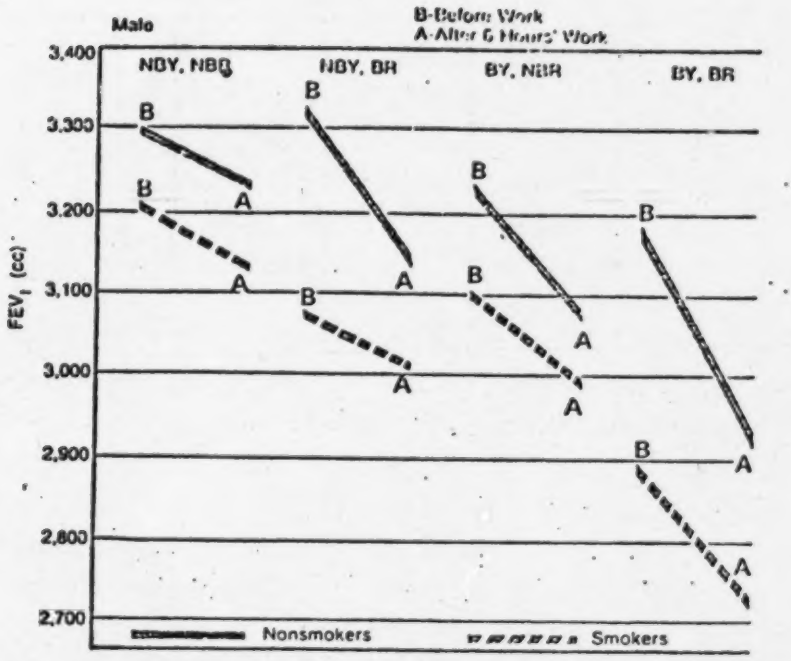


Fig. 5—Byssinosis, bronchitis, and smoking effects on FEV_1 before and after six hours' work adjusted to base age 40 years in men.

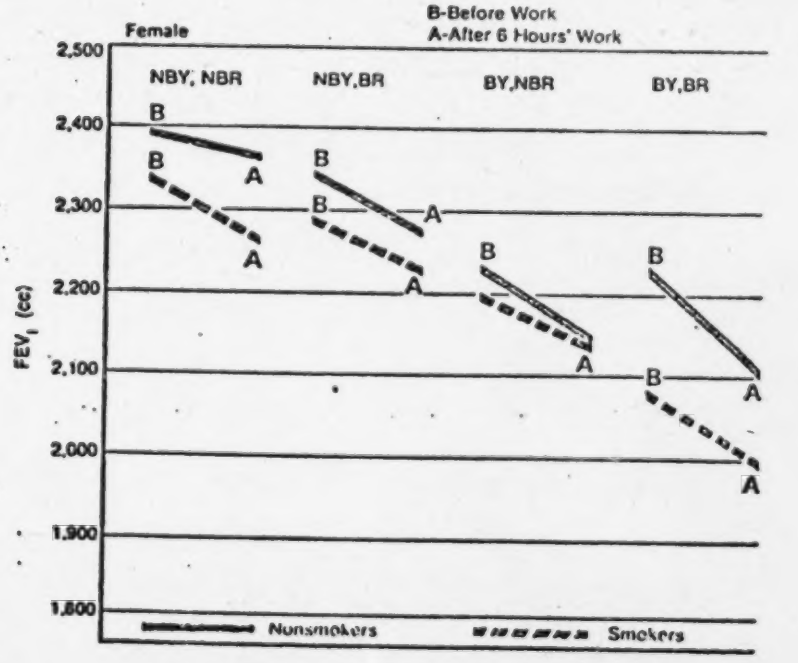


Fig. 6—Byssinosis, bronchitis, and smoking effects on FEV_1 before and after six hours' work adjusted to base age 40 years in women.

Exhibit 42B

SUPPLEMENTAL SUBMISSION TO STATEMENT AND TESTIMONY OF JACK W. WHITWORTH, M.D. MEDICAL DIRECTOR WEST POINT PEPPERELL

The data and information contained herein is made as a supplement to the oral testimony given at the hearings on the Proposed Cotton Dust Standard on April 21, 1977 (Transcript, pp. 1642-1745) and to the written statement submitted on April 1, 1977 (Exhibit No. 42) for the record as part of the American Textile Manufacturers Institute, Inc. presentation for the record. All data shown herein is taken from the initial survey referred to in the written statement submitted on April 1, 1977 (Exhibit No. 42).

In response to questions raised by representatives of various organizations during the oral testimony, shown below by sex, age group, and length of employment are the number of the 9,181 employees referred to in the written statement (Exhibit No. 42) who had the subjective symptoms of byssinosis (Grade 1/2, 1 and 2) as determined by responses to the questionnaire:

	AGE GROUPS			
	Less than 30	*30-39*	*40-49*	*50 and over*
Male	18	12	23	43
Female	5	7	9	6

Average Age—44.3 Years

	Length of Employment (Years) in Cotton Mills					
	0-8	*8-16*	*16-24*	*24-32*	*32-40*	*40-48*
Male	19	14	12	23	12	16
Female	14	2	3	5	1	2

Average Length of Employment—20.9 Years

In addition, based on our review of the individual records, the number of employees having subjective symptoms of byssinosis, Grade 1/2, as determined by the response to the questionnaire who *also* had a ten percent or greater drop in their pre-shift versus post-shift FEV_1 was 27 or 32.2% of the 87 employees determined to be Grade 1/2. In contrast, the number of employees having subjective symptoms of byssinosis, Grades 1 *and* 2, as determined by response to the questionnaire who also had a ten percent or greater drop in their pre-shift versus post-shift FEV_1 was 18 or 50.0% of the employees classified in Grade 1 and 2. In this regard, it must be noted that the percentage of employees who indicated both subjective symptoms of byssinosis, Grades 1/2, 1 and 2, as determined by their response to the questionnaire and who *also* had a ten percent or greater drop in their pre-shift versus post-shift FEV_1 was 0.5% (45 of 9,181).

Finally, as a result of the review to furnish the information set forth above, the first two sentences on page 6 of the written statement (Exhibit No. 42) submitted on April 1, 1977 should be revised to read as follows:

"Of the 9,181 individuals studied, 123 or 1.34% gave positive answers to the questions related to byssinosis as graded by the Schilling Method (Grade 1/2, Grade I, or Grade II). Of the 123 employees, 87 or 70.7% were Grade 1/2, 34 or 27.6% were Grade I and 2 or 1.6% (0.02% of all employees) were Grade II."

Exhibit 46

STATEMENT OF CHARLES F. MARTIN, M.D.
MEDICAL DIRECTOR
CONE MILLS CORPORATION
AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC.
BEFORE THE PUBLIC HEARING CONCERNING THE PROPOSED CHANGE IN THE OSHA COTTON DUST STANDARD

I am Charles F. Martin, Medical Director for Cone Mills Corporation. I have been employed with Cone since October, 1972. I would like to express some points of view as a physician who is interested in and responsible for the health of employees in a cotton textile company. I have had the opportunity of reviewing the Proposed Cotton Dust Standard, both the supporting data and the portion entitled Medical Surveillance. From my own experience, I do not feel that the prevalence rates expressed in some of the supporting documents accurately reflect what is found in the cotton textile industry.

I would like to tell you of my experiences and data which were drawn from a survey of a cotton textile manufacturing company, using both the Modified British Medical Research Council questionnaire and pulmonary function testing.

During 1973, spirograms, which are lung function tests, and questionnaires were completed by several thousand employees of Cone Mills Corporation. The data for this presentation was drawn from the records of 6,631 employees. The employees in this survey were located at 12 textile processing plants using medium and low grade cotton and at two plants that blended synthetic fiber with these various grades of cotton.

For all intents and purposes, these textile employees could be described as a "virgin" population as less than 100 of these had seen the questionnaire or performed pulmonary function tests prior to responding to the questionnaire or taking the test.

The data developed during the survey was studied in depth at a later date by Mr. James E. Higgins, M.S., biostatistician for the Department of Biostatistics, School of Public Health, Chapel Hill, N. C. and published as a paper entitled "Byssinosis and other Respiratory Diseases" in the *Journal of Occupational Medicine,* July, 1976.

The questionnaire utilized was almost the same as the one which appears in the proposed standard. The subjective responses to the questions regarding byssinosis were graded, following the classifications of Schilling, except for Grade 3, which was omitted as Grade 3 required the positive history of Grade 2 combined with objective evidence of permanent respiratory incapacity while our study primarily related to subjective symptoms of pulmonary function tests.

The questionnaires were valuable in giving us an opportunity to look at the distribution of employees by sex, race, length of employment and actual workplace.

I am supplying you with a set of tables and graphs which will make an explanation more easily followed. *Table 1* gives a distribution of our population by sex and race and shows that there were more males than females by 10% and that one-third of our population were non-whites. This population of non-whites were all blacks and this we found to be an important consideration in the grading of pulmonary function tests. Studies indicate that non-white populations have been found to have lower pulmonary function volumes.

TABLE 1
DISTRIBUTION OF EMPLOYEES BY SEX AND RACE

	No.	*%*		*No.*	*%*
Male	3,693	55.7	Female	2,938	44.3
White	2,484	67.2	White	1,867	63.5
Non-white	1,209	32.8	Non-white	1,071	36.5

Table 2 presents the length of employment by sex and race. It is important here to note that there is a high proportion of older white males who have been employed for more than 25 years. The non-whites, or black population, shows exactly the opposite trend:

TABLE 2
DISTRIBUTION OF LENGTH OF EMPLOYMENT BY SEX AND RACE

	Length of Employment (Years) in Cotton Mills							
	<1	*1-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-30*	*>30*
Male								
White	178	267	239	232	225	276	362	672
Non-white	247	333	308	78	45	41	62	65
Female								
White	141	206	253	174	137	186	283	460
Non-white	354	376	277	15	2	1	3	4

Table 3 is quite important to the discussion of contact with raw cotton trash dust as it tells us the numbers of people with complaints of chest tightness on Mondays or the first day of work after exposure which responses were elicited by the questionnaire. In brief, 3% or 199 individuals of this population of 6,631 individuals were placed in Grades 1/2 and 1. This means then that a total of 6,432 employees surveyed had no complaints which could be interpreted as subjective symptoms of byssinosis.

TABLE 3
BYSSINOSIS BY SEX AND RACE

	Byssinosis Grade				
Sex/Race	*0 (negative)*	*1/2*	*1*	*Total Byssinosis*	*%*
Male					
White	2,395	56	33	89	3.6
Non-white	1,142	57	10	67	5.5
Female					
White	1,839	16	12	28	1.5
Non-white	1,056	11	4	15	1.4
Total	6,432	140	59	199	3.0

Further analysis shows that the prevalence of the subjective symptoms of byssinosis could be related to length of employment, and that this prevalence was higher in non-white males than in white males. However, the total numbers of white males was much higher than non-white. These conclusions will become evident if you would take a moment to review *Figure 1*.

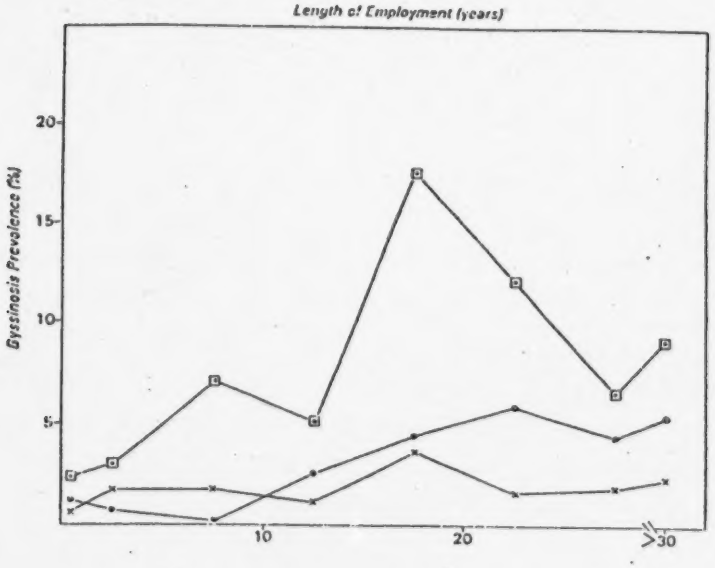
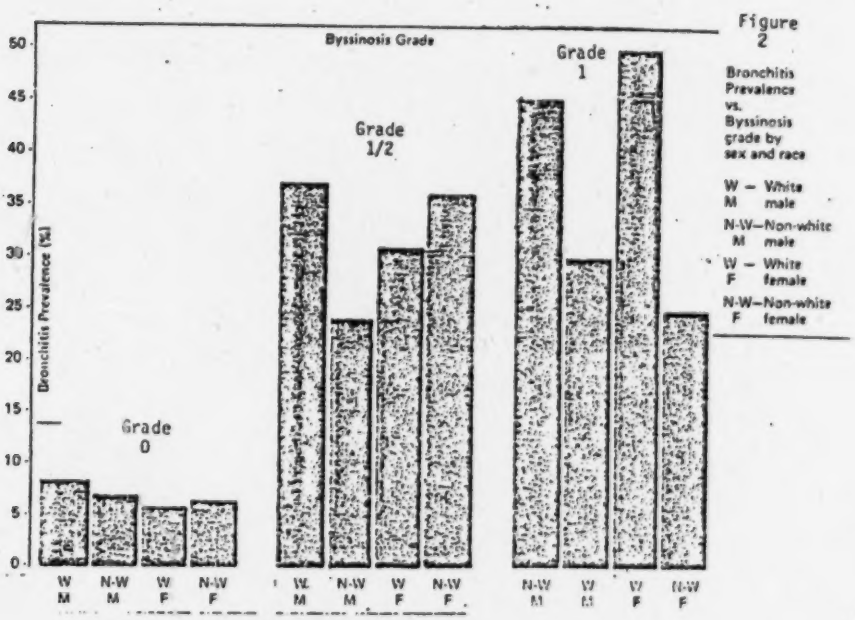


Fig 1.
Byssinosis prevalence vs. length of employment in cotton mills by sex and race
• White male
⊡ Non-white male
× Female

Now let us consider the relationship of byssinosis and bronchitis grades. We found that when byssinosis grades were compared with bronchitis grades by sex and race that byssinosis grades increased as bronchitis grades increased. Bronchitis prevalence was small (less than 1%) for those who did not give a history of subjective symptoms of byssinosis and much larger (greater than 25%) for employees with byssinosis grades one-half and one. These factors are graphically pointed out in *Figure 2* and says simply those people who complained of change in breathing on some Mondays, or every Monday also are noted to have bronchitis.

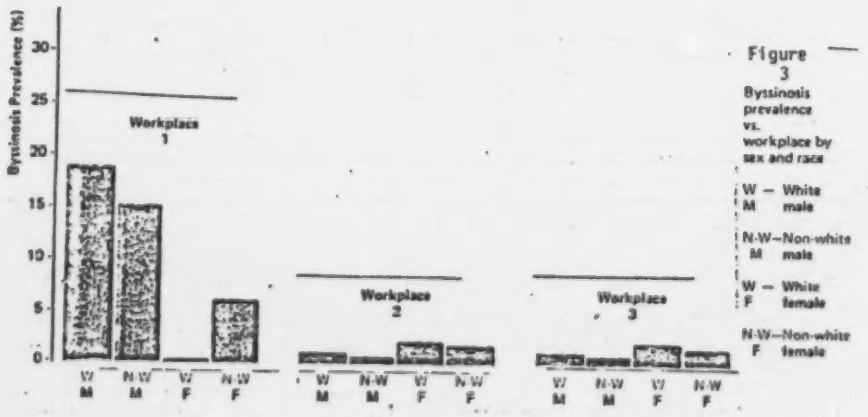


Byssinosis and Workplace

When it was established that there were some people with a history of complaints it became important to ascertain where these people spend their working lives. At the time of

this survey, accurate cotton dust measurements were not available. We simply divided the plants into three arbitrary groups representing three assumed levels for cotton dust. *Workplace 1* represented Opening, Picking and Carding; *Workplace 2*—Spinning, Winding, Twisting; *Workplace 3* —Spooling, Warping, Slashing, Weaving and other, such as Cloth Room or Maintenance. In such a division, one would expect the levels of raw cotton dust to be lower in Workplace 2 than Workplace 1 and lower in Workplace 3 than the other two. To be able to develop a true workplace history, only individuals with work histories *entirely* in each one of these three workplaces were considered. *This gave us 5,458 individuals.* In *Figure 3* you will see that, as expected, the subjective symptoms of byssinosis were more prevalent in Workplace 1. This area primarily employs men, many of whom have been on these jobs for a considerable number of years.

There were found to be *105* cases of byssinosis, grade 1/2 & 1 in Workplace 1. In terms of percentages, this represented 64% of all those complaining of subjective symptoms of byssinosis. However, only 12% of the population were employed in these first few steps of cotton processing.



Byssinosis and Smoking Habits

Now let us look at *Figure 4* in which we find a byssinosis prevalence, and a number of other factors; workplace, sex and smoking habits. The only significant association between byssinosis and smoking habits were found for those males in Workplace 1. The Workplace 1 males did not possess smoking habits which differ greatly from the general male population except that the rate of heavy smoking was lower. Prevalence rates for byssinosis in this workplace location indicate possible interaction between the workplace and smoking habits.

It is worth the comment that cigarette smoking habits and bronchitis seem to closely parallel complaints of byssinosis for those males who are employed in Workplace 1. The clinical observation that byssinosis complaints occur primarily in cigarette smokers is borne out by the finding that only 20% of those complaining of byssinosis were non-smokers.

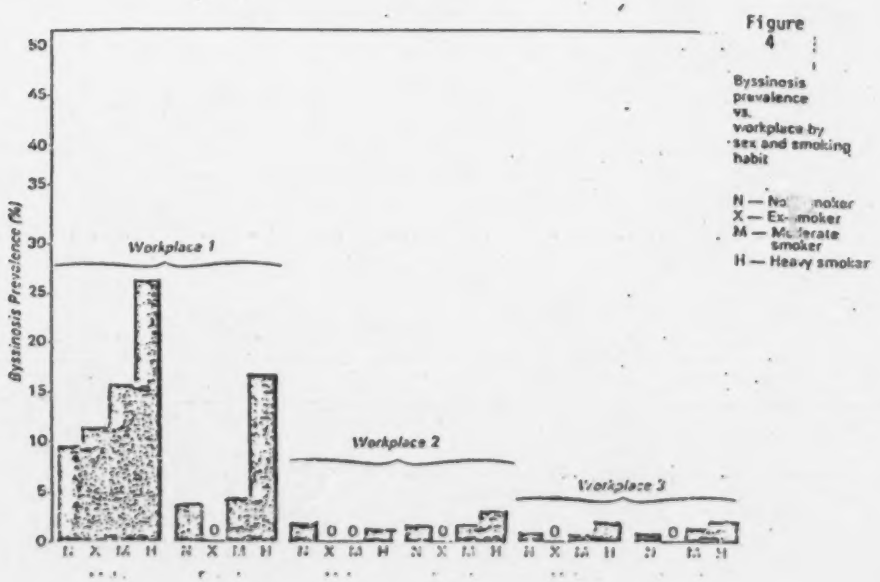


Figure 4

Byssinosis prevalence vs. workplace by sex and smoking habit

Following completion of the questionnaires, spirograms were performed on each individual. Using the answers on the questionnaire and the result of spirograms, a decision was made to reinterview and retest those employees who were classified as having significant complaints and/or poor pulmonary function tests which did not meet pre-determined criteria. In using this type of separation procedure, approximately 10% of our study population were re-examined. Those who were found to have any type of respiratory disease received further clinical evaluation. For, it is paramount to recognize in a medical survey any disease which is found is important. Thus, although we were primarily interested in ascertaining the prevalence of byssinosis, other respiratory diseases which were uncovered were certainly of equal importance.

Since 1973 the spirogram program has been continuing on an annual basis with the selection of certain employees for further clinical evaluations. The British Research Council Questionnaire has been administered as an initial questionnaire for new people coming into the program and has not been repeated except for those for whom additional evaluation is indicated.

Final conclusions which were drawn from this study were that a majority of the complaints of byssinosis were found among the relatively small subset of employees located in the high dust work areas of Opening, Picking, and Carding. Byssinosis was significantly associated with bronchitis. Smoking was significantly associated with byssinosis for employees in Opening, Picking and Carding. While 3% of the population had subjective symptoms (history) of byssinosis, only 0.8% indicated both subjective symptoms and objective signs (a 10% or greater drop during the workday of forced expiratory volume for one second [FEV_1]).

CONCLUSIONS

With our four-year experience and conclusions as background, I would like to comment on the medical surveillance program as it is proposed in the cotton dust standard.

SPECIFIC COMMENTS ON MEDICAL SURVEILLANCE PROGRAM

THE STANDARD QUESTIONNAIRE

It is a valid tool when used for evaluating an untested population to establish an initial history, but it is lacking in flexibility, and in the future I am sure will be a victim of coaching. There are additional questionnaires which would aid in establishing history of change in respiratory function which should be acceptable from a clinical point of view.

PERIODIC EXAMINATION

This portion of the regulations would strain our already overtaxed resources. I do not feel that there is any rationale in providing an examination every six months for those with an FEV_1 greater than 80% of predicted with an FEV_1 decrement of 5% or for those employees whose FEV_1 is, for example, 70-79% if there is no further FEV_1 decrement.

A spirogram is effort dependent and requires the cooperation of the individual to produce the maximum effort. We have found it next to impossible to maintain a 5% range, testing an individual from one part of the day to another. Actually, this degree of tolerance or low volume change would be difficult to maintain in a hospital laboratory setting using trained people for the test subjects.

Objections are raised to (3) (a) and (b) as currently presented. These subparagraphs would dictate time and

effort being spent every six months in testing a large portion of the population, most of whom will be repeatedly found not to have pulmonary disease. A medical decision should be made concerning questionable spirograms as our attention must be directed toward those workers who would require intervention.

The basic phsiologic concept is that byssinosis is a reversible bronchio-constricting airway condition. The susceptibility to the condition is on an individual basis, and many years of contact to raw cotton trash dust is required before any chronic irreversible changes can be noted.

It would seem reasonable then to construct screening procedures for cotton textile manufacturing employees that have been developed for preventive medical and public health programs. Such a screening program would include the standard questionnaire initially, followed by pulmonary function tests. The analysis of this data would be used to identify those with respiratory complaints and/or poor spirograms. Re-question and re-test specific individuals to validate the questionnaires and test findings and make specific recommendations for future action would be required.

The bulk of the population then, whose examinations did not indicate immediate concern would be followed by an annual test schedule which would note any individual changes.

Thus the entire population would be under regular observation but the time would be available to care for those with specific needs.

PHYSICIAN'S WRITTEN OPINION

If the physician were supplied with a questionnaire and spirogram of the employee and asked to give an "opinion

as to whether the employee has any detected medical condition which would place the employee at increased risk of material impairment of health from exposure to cotton dust" as proposed, the physician would find it difficult to comply. In many instances I would foresee that the physician would require another physical examination and laboratory evaluation before attempting to give such an opinion. Again it would lead to a quandary because the physician could not always know what the term *"Material Impairment"* might imply. Neither is there a specific test for "exposure to cotton dust" as the chemical compounds which may have health effects have not been identified.

Objections are raised to (h) (5) (ii) in that there seems to be a conflict with (h) (5) (i) and (a).

The heading (h) (5) (ii) would limit the communication between doctor and patient and would restrict health counseling *only* to the cotton dust exposure, eliminating the possibility of employment in a second job with another industry. Also, counseling on the best known pulmonary irritant, cigarette smoking, would apparently be eliminated.

In conclusion, medical surveillance of our cotton textile employees is not an insolvable problem if factual information is taken into consideration and regulations are written so that we can comply with them from a professional as well as industrial management standpoint.

Exhibit 2

EXCERPT FROM FEDERAL REGISTER

TUESDAY, DECEMBER 28, 1976

PART III

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

COTTON DUST

Proposed Standards for Exposure and Notice of Hearing

* * *

Byssinosis is a specific respiratory disease, the symptoms of which are attributable to the action of cotton dust on the respiratory passages. The effects of byssinosis can be temporary or permanent, depending upon the exposure and the individual, and can lead in time to chronic obstructive lung disease, primarily chronic bronchitis. (*20, 21*) Initially, the individual notices a tightness in the chest occurring on the first day of the work week. The tightness may be accompanied by a measurable decrease in breathing capacity as measured by pulmonary function tests. Usually, the condition is mild and temporary at first, tending in time to progress to the stage where it bothers the workers on other days of the work week. This progression, which is characterized by constriction of the bronchial tubes of the lung, leads to a permanent narrowing of these airways. The individual develops a chronic cough with a production of phlegm and increasing shortness of breath. At this stage, the condition is readily detectable by pulmonary function measurements. Total disability and even death may follow. The description of these detailed symptoms appeared as early as 1908 in the work of Collis. *(10)*

Exhibit 6, No. 76

July 26, 1976

Contract No. J-9-F-6-0035

RTI Project No. 44U-1204-1

COTTON DUST

PART 1: CHAPTERS I-VI

EXCERPTS FROM

TECHNOLOGICAL FEASIBILITY ASSESSMENT

AND

FINAL INFLATIONARY IMPACT STATEMENT

Prepared for:
Occupational Safety and Health Administration
U.S. Department of Labor

RESEARCH TRIANGLE INSTITUTE
Post Office Box 12194
Research Triangle Park, North Carolina 27709

[I-15]

TABLE I-6

TOTAL INSTALLED AND ANNUALIZED COMPLIANCE COSTS: ALL SECTORS
(Costs in Millions of Dollars)

Industry Sector	*Exposure Limit* (mg/m^3)	*Installed Cost*	*Annualized Capital Charge*	*Direct Operating Cost*	*Energy Cost*	*Total Annualized Cost*
Yarn Production	0.5	211.8	33.8	6.9	20.6	61.5
	0.2	984.4	158.3	15.6	67.9	241.6
	0.1	2,802.7	450.6	23.3	147.0	620.6
Cotton Ginning	0.5	16.9	2.7	4.9	1.8	9.4
	0.2	292.2	47.0	13.2	30.3	90.4
	0.1	343.6	55.2	14.7	35.4	105.3
Cotton Weaving	0.5	9.1	1.5	1.7	0.6	3.7
	0.2	1,387.9	223.1	40.7	86.3	350.1
	0.1	3,939.1	633.2	112.6	245.1	990.9
Waste Processing	0.5	17.3	2.8	2.6	2.5	7.9
	0.2	32.0	5.2	2.9	4.7	12.8
	0.1	56.1	9.0	3.4	8.2	20.6
Total	0.5	255.1	40.8	16.1	25.5	82.5
	0.2	2,696.5	433.6	72.4	189.2	694.9
	0.1	7,141.5	1,148.0	154.0	435.7	1,737.4

TABLE V-11

TOTAL INDUSTRY COSTS FOR ENGINEERING CONTROLS (Weaving)

	0.5 mg/m³				0.2 mg/m³				0.1 mg/m³			
Equipment Type	*Capital* ($10⁶)	*Maintenance and Operations* ($10³/yr)	*Energy* (10⁶ Kwh/yr)	*Labor* (man-hrs/yr)	*Capital* ($10⁶)	*Maintenance and Operations* ($10³/yr)	*Energy* (10⁶ Kwh/yr)	*Labor* (man-hrs/yr)	*Capital* ($10⁶)	*Maintenance and Operations* ($10³/yr)	*Energy* (10⁶ Kwh/yr)	*Labor* (man-hrs/yr)
Winders	1.620	11.267	8.350	1,609	6.265	54.599	31.010	3,900	17,794	155.07	88.32	11,075
Spoolers	6.088	45.577	31.383	6,511	35.306	351.60	175.147	50,510	100.270	999.53	497.42	142,645
Twisters	—	—	—	—	47.464	433.36	237.320	61,908	134.798	1,231.60	673.99	175,819
Warpers	—	—	—	—	38.702	468.50	269.291	66,928	109.913	1,330.53	764.78	190,076
Looms	—	—	—	—	1,258.75	37,762,56	5,244.80	539,465	3,574.86	107,245.67	14,895.23	1,532,081

[VI-8—VI-9] b. *Economic Impact Analysis Procedure*

The economic impact analysis that follows in Section 2 assesses and evaluates the likely economic impact upon six industries (SIC Codes 2211, 2221, 2281, 2257, 2284, and 2296) and upon the U.S. economy of the three OSHA exposure limits for cotton dust of 0.5, 0.2 and 0.1 mg/m^3. In Section 3, similar economic impact analyses are reported for the other cotton processing industries. Specifically, this chapter includes the analysis of impacts on:

1) Additional employment requirements.

2) Energy consumption.

3) Increases in production costs and consequent price increases by affected industries.

4) Capital requirements and capital financing problems.

5) Competition effects on profit and market structure.

6) Inflationary impact on consumer and U.S. economy.

7) Employment impact due to the contraction of output demand.

Major procedures adopted in the impact analysis are as follows: first, in order to determine the levels of average price increases which are likely to occur after the imposition of the exposure limits, it has been necessary to estimate the average rate of return on investment at the industry level, both before and after implementation of the required controls. It is then assumed that the average output price levels of each of the six industries will be increased after compliance to the level required to maintain the pre-compliance rate of return on investment.

TABLE VI-9

FINANCIAL IMPACT OF OSHA COTTON DUST EXPOSURE LIMITS
($/Pound of Cotton Yarn Produced)

SIC	Exposure Limit mg/m³	Total Assets	Average Price of Cotton Yarn ($/lb.)	Total Cost	Profit After Tax	Rate of Return to Investment (ROI)	Price Increase Required to Maintain Pre-Control ROI ($/lb.)	Percent of Increase
2211	0.5	0.775	1.176	1.138	.0207	.0267	.020	1.7
	0.2	0.975	1.176	1.185	−.0046	−.0047	.082	7.0
	0.1	1.445	1.176	1.283	−.0580	−.0401	.216	18.3
2221	0.5	0.775	1.176	1.138	.0207	.0267	.020	1.7
	0.2	0.975	1.176	1.185	−.0046	−.0047	.082	7.0
	0.1	1.445	1.176	1.283	−.0580	−.0267	.216	18.3
2281	0.5	0.775	1.176	1.138	.0207	−.0267	.020	1.7
	0.2	0.975	1.176	1.185	−.0046	−.0047	.082	7.0
	0.1	1.445	1.176	1.283	−.0580	−.0401	.216	18.3
2257	0.5	0.972	1.483	1.434	.0267	.0274	.024	1.6
	0.2	1.242	1.483	1.495	−.0068	−.0054	.106	7.2
	0.1	1.908	1.483	1.626	−.0778	−.0408	.287	19.4
2284	0.5	0.972	1.483	1.434	.0267	.0274	.024	1.6
	0.2	1.242	1.483	1.495	−.0068	−.0054	.106	7.2
	0.1	1.908	1.483	1.626	−.0778	−.0408	.287	19.4
2296	0.5	0.679	1.023	0.991	.0173	.0255	.019	1.9
	0.2	0.863	1.023	1.035	−.0064	−.0074	.077	7.5
	0.1	1.281	1.023	1.123	−.0545	−.0425	.197	19.2

Sources: Calculations are based on data in Tables VI-3 and VI-7a.

[VI-35—VI-37] As mentioned previously, this is why the rate of return approach is preferred to the simple cost pass-through approach which assumes the price increases per dollar of sales equals the total annualized cost per dollar of sales. Moreover, it is important to note that price increases required to maintain pre-control ROI for the 0.1 mg/m^3 exposure limit are 200—300 percent of those required at the 0.2 mg/m^3 exposure limit and 900—1000 percent of those required by the 0.5 mg/m^3 exposure limit. Additionally, in the absence of price increases, profit-after-taxes and ROI would be very small or negative in some cases.

Table VI-9 represents similar computations as above, but they are estimated per pound of cotton yarn produced. The average prices of cotton yarn produced in each sector are estimated on the basis of the observation that SIC Codes 2257 and 2284 typically produce and consume a higher quality of yarn than the other sectors and SIC Code 2296 consumes a lower quality of yarn. SIC Codes 2211 and 2221 are assumed to produce and consume a combination of several qualities of yarn, similar to that produced by SIC Code 2281.

Table VI-9 indicates, for example, that for SIC Codes 2211, 2221, and 2281, 2.0, 8.2 and 21.6 cents are required per pound of cotton yarn produced to maintain the pre-control return on investment after exposure limits of 0.5, 0.2, and 0.1 mg/m^3 are imposed. SIC Codes 2257 and 2284 require 2.4, 10.6 and 28.7 cents per pound of yarn to maintain pre-control rates of return and to satisfy the three exposure limits. SIC Code 2296 requires 1.9, 7.7 and 19.7 cents. In this computation, the production losses in yarn spinning were ignored. It is worth noting that all the sectors had negative "profits after taxes" for 0.2 and 0.1 mg/m^3 exposure limits, if no price increases are assumed.

[VI-39] * * *

As is well known (from Marshall) the derived input demand elasticities depend upon four different factors: elasticity of input substitution; supply elasticity of inputs; share of that input cost in total production cost; and output demand elasticities for the products which are produced using these inputs. The detailed data on these factors are not available and to estimate the accurate derived demand elasticity is beyond the scope of this study. Therefore, it was decided to adopt an extreme assumption of zero price demand elasticity in computing the post-control price increases. However, it is of great interest to investigate how much bias the estimated results will have due to the assumption of zero price elasticity of demand when the real elasticity is actually non-zero. More accurately, equation (2) can be rewritten as:

$$\text{PROI} = \left[\frac{(\text{P} + \text{PINC}) \times (1 - \text{n} \cdot \text{PINC}) \times \text{PRVL}}{(\text{PRAS} + \text{TIC}) \times \text{PRVL}} - \frac{[\text{PRTC} \times \cdot 90 \times (1 - \text{n} \cdot \text{PINC}) \times \text{PRVL} + \text{PRTC} \times \cdot 1 \times \text{PRVL} + \text{TAC} \times \text{PRVL}]}{(\text{PRAS} + \text{TIC}) \times \text{PRVL}}\right] \times (1 - \text{Tax Rate}) \quad (4)$$

where n is the price elasticity of demand for the output of the sector, and PRVL is the pre-control total value of industry shipments.

Exhibit 6, No. 76

AMERICAN TEXTILE MFRS. INSTITUTE, INC.

Wachovia Center, 400 S. Tryon St.
Charlotte, N. C. 28285

July 26, 1976

Contract No. J-9-F-6-0035
RTI Project No. 44U-1204-1

COTTON DUST

PART II: APPENDIXES

EXCERPTS FROM TECHNOLOGICAL FEASIBILITY ASSESSMENT AND FINAL INFLATIONARY IMPACT STATEMENT

Prepared for:
Occupational Safety and Health Administration
U.S. Department of Labor

Research Triangle Institute
Post Office Box 12194
Research Triangle Park, North Carolina 27709

[C-35] 8. *Fiber Consumption*

Cotton's share of the total domestic fiber market has declined consistently from the 1947-52 average of about 70 percent to 29.5 percent of the market in 1974. Cotton's market share remained above 50 percent until 1967, as

shown in Table C-20, after which it dropped rapidly. The decline in mill consumption of cotton in the U.S. was due primarily to the development of synthetic fibers and yarns, and in particular the development of textured yarns. Fabrics made from some synthetic fibers have historically possessed attractive properties such as superior wear and easy-care properties, but many of these fabrics were smooth and slippery to the touch and felt clammy when worn next to the skin. They often did not possess the warmth and comfort of fabrics made from cotton and other natural fibers. Synthetic yarns spun from staple afforded some of the advantages of cotton, and helped alleviate some of the disadvantages of filament yarns, but not all of them. Textured yarns followed.

Fabrics made from textured yarns have greater bulk, drier hand, high covering power, increased comfort, increased moisture absorption, improved thermal insulation, and more subdued luster when compared to fabrics made from continuous filament yarns. When compared to fabrics made from spun staple of equivalent denier*, fabrics made from textured yarns have (typically) equal or lower bulk density, a drier and crisper handle, a significantly improved freedom from pilling, and much greater uniformity. These properties substantially improve the quality of the fabric and add to consumer satisfaction. In addition, blends of cotton and synthetics, primarily nylon and polyester, have cut substantially into the market for cotton. In 1974, consumption of man-made fiber at the mill level constituted almost 70 percent of the market.

---

* A unit of fineness for silk, rayon or nylon yarn equal to the fineness of yarn weighing one gram for each 9,000 meters.

TABLE C-20

TOTAL FIBER CONSUMPTION BY U.S. TEXTILE MILLS

	Total Mill Fiber Consumption	*Cotton*		*Manmade Fiber*		*Wool*	
Year	10^6 lbs.	10^6 lbs.	Share (%)	10^6 lbs.	Share (%)	10^6 lbs.	Share (%)
1947	6433.7	4685.6	72.5	1057.9	16.4	698.2	10.9
1948	6409.2	4463.5	69.6	1239.7	19.3	693.1	10.8
1949	5451.5	3839.1	70.4	1101.9	20.2	500.4	9.2
1950	6857.3	4882.7	68.3	1518.4	22.1	634.8	9.3
1951	6849.7	4868.6	71.1	1478.6	21.6	484.1	7.1
1952	6446.8	4470.9	69.4	1490.2	23.1	466.4	7.2
1953	6489.2	4456.1	68.7	1523.7	23.5	493.9	7.6
1954	6035.2	4127.3	68.4	1508.3	25.0	380.8	6.4
1955	6717.7	4382.4	65.2	1902.5	28.3	413.8	6.2
1956	6551.4	4362.6	66.6	1727.4	26.4	440.8	6.7
1957	6237.3	4060.4	65.1	1792.6	28.7	368.7	5.9
1958	5971.5	3866.9	64.8	1764.2	29.5	331.1	5.5
1959	6846.4	4377.8	63.9	2064.8	30.2	435.3	6.4
1960	6491.6	4232.8	65.2	1878.0	28.9	411.0	6.3
1961	6570.7	4122.3	62.7	2064.4	31.4	412.1	6.3
1962	7654.6	4229.8	60.0	2425.1	34.4	429.1	6.1
1963	7226.9	4080.6	56.5	2775.0	38.4	411.7	5.9
1964	7763.3	4286.9	55.2	3162.2	40.7	356.7	4.6
1965	8478.7	4522.2	53.3	3614.1	42.6	387.0	4.6
1966	8990.8	4676.8	52.0	3990.1	44.4	370.2	4.1
1967	8980.8	4470.2	49.8	4245.3	47.3	312.5	3.5
1968	9781.7	4188.0	42.8	5305.5	54.2	329.7	3.4
1969	9798.0	3972.5	40.5	5552.2	56.7	312.8	3.2
1970	9557.2	3853.8	40.3	5501.3	57.6	240.3	2.5
1971	10677.1	3985.6	37.3	6539.3	61.2	191.5	1.8
1972	11862.0	3864.0	33.1	7602.1	65.2	218.6	1.9
1973	12474.1	3657.6	29.3	8665.3	69.5	151.3	1.2
1974	11194.9	3309.0	29.6	7792.4	69.6	93.5	0.8

Source: USDA, *U.S. Textile Fiber Demand: Price Elasticities in Major End-Use Markets*, 1974, and USDA, *Cotton and Wool Situation*, 1976

TABLE C-25

U.S. IMPORTS OF TEXTILE MANUFACTURES IN DOLLARS AND EQUIVALENT SQUARE YARDS, BY CALENDAR YEAR, 1960-1975

	Cotton[a]		*Manmade Fiber*[b]		*Wool*[c]		*Total*[c]	
Year	10^6	10^6 Equivalent Sq. Yds.	10^6	10^6 Equivalent Sq. Yds.	10^6	10^6 Equivalent Sq. Yds.	10^6	10^6 Equivalent Sq. Yds.
1960	269	1,054	61	149	216	111	546	1,314
1961	199	720	60	151	200	85	459	956
1962	307	1,165	78	213	272	156	657	1,534
1963	299	1,101	90	221	297	161	686	1,483
1964	310	1,058	129	328	289	138	728	1,524
1965	369	1,313	193	566	357	212	919	2,090
1966	463	1,824	258	798	354	204	1,075	2,826
1967	417	1,485	312	934	327	167	1,056	2,586
1968	477	1,648	499	1,453	410	210	1,386	3,311
1969	527	1,652	695	1,783	410	192	1,632	3,626
1970	536	1,537	1,053	2,760	358	170	1,947	4,466
1971	590	1,611	1,553	4,229	292	117	2,435	5,957
1972	801	1,924	1,730	4,275	314	117	2,845	6,317
1973	887	1,592	1,848	3,434	368	99	3,103	5,125
1974	1,034	1,463	1,777	2,862	356	86	3,167	4,410
1975	1,000	1,281	1,773	2,467	340	78	3,114	3,826

Source: U.S. Department of Commerce and ATMI *Textile Hi-Lights*, March 1974 and March 1976, pp. 26 & 27.

[a] U.S. Department of Commerce conversion factors used by ATMI to convert units of yarns, apparel, make-up goods and miscellaneous items to sq. yd. equivalent.

[b] Equivalent square yards for 1960 and 1961 were converted by ATMI; for 1962-1975, U.S. Department of Commerce conversion factors were used by ATMI to convert sq. yd. equivalent.

[c] Includes wool floor coverings from 1960-1973.

TABLE C-27

U.S. EXPORTS OF COTTON TEXTILE MANUFACTURES, BY CALENDAR YEARS, 1963-1975
(Millions of Equivalent Square Yards [a])

Year	Yarns	Broadwoven Fabric	Apparel	Make-Up Goods[b]	Miscel-laneous
1963	35.1	368.2	64.2	45.9	99.4
1964	42.9	393.1	76.0	59.1	80.8
1965	38.0	308.1	73.2	57.7	100.6
1966	36.8	336.6	83.1	59.7	97.2
1967	32.4	288.0	94.1	62.7	98.4
1968	26.9	273.1	111.1	61.3	105.8
1969	160.7	299.7	143.3	55.1	119.0
1970	70.2	266.6	119.9	54.0	118.8
1971	75.2	301.0	120.2	59.8	138.5
1972	86.5	378.7	137.6	67.3	202.8
1973	81.4	443.2	120.9	98.0	246.8
1974	94.4	517.0	161.6	131.7	310.3
1975	65.2	454.6	143.2	132.9	250.5

Source: U.S. Department of Commerce and ATMI, *Textile Hi-Lights*, March, 1974 and 1976, p. 28.

[a] U.S. Department of Commerce conversion factors used to convert units to square yards equivalents, except for broadwoven fabrics.

[b] Make-up goods consist of sheets, pillow cases, dish towels, other towels, table cloths, bedspreads, quilts, etc.

By 1970 over $1.94 billion of foreign textile manufactures reached U.S. markets. Of this import figure, about $1.05 billion was attributable to manmade fiber products, about $536 million was cotton products, and $358 million was wool products. In 1971 imports of manmade fiber products into the U.S. increased 50 percent over the 1970 figure to over $1.55 billion, as compared to $590 million for cotton products, $292 million for wool products, $2.435 billion for the total imports of textile manufactures, and $2.9 billion for total textile imports.

Textile manufactures, as discussed here, are essentially manufactured textile products and are a good measure of the foreign trade activity most central to the industries of interest in this study, namely SIC Codes 2211, 2221, and 2281. In this sense, textile manufactures consist of yarns, broadwoven fabrics, woven and knitted apparel, make-up goods (pillow cases, dish towels, other towels, table cloths, sheets, bedspreads, quilts, etc.), and miscellaneous items not classified elsewhere (woven elastic, fishing nets, etc.) See Tables C-25, C-26 and C-27 for additional data.

Given these data, it is clear that the LTA, with its singular emphasis upon cotton and cotton blends, was inadequate to control the growth rate of textile and apparel imports into the U.S. As a consequence, in 1971 President Nixon's Administration led the negotiation of new bilateral trade agreements with five countries (Japan, Taiwan, Hong Kong, South Korea, and Malaysia) covering exports to the U.S. of wool and manmade fiber textiles and apparel, in addition to cotton textile and apparel products covered under the LTA. These agreements imposed trade limitations upon some eighteen classifications of textile and apparel products from Japan, covering some 50 percent of Japanese exports of wool and manmade fiber products to the U.S., and ten categories, covering about 80 percent of their U.S.

exports, for the other countries. These became effective on October 1, 1971. Under the terms of these agreements, Japan agreed to limit the rate of growth of exports of these classifications of textile and apparel products to the U.S. to 5 percent per year for man-made and one percent for woolen products for three years, while the other agreements were for five years and limited the rate of growth of exports of these products to the U.S. to approximately 7.5 percent per year. In 1973, additional agreements were negotiated with Singapore and Macao.

These agreements were neither a comprehensive nor a long-run solution, and a more general international framework was sought. In the Multi-lateral Trade Negotiations in Geneva, which dealt with all international trade activities (including textiles and apparel), and in other negotiations, GATT developed the Arrangement Regarding International Trade in Textiles or the Multi-Fiber Arrangement Regarding International Trade in Textiles (MFA), which was accepted by the U.S. and became effective on January 1, 1974. Under the MFA, the U.S. has negotiated bilateral agreements with some sixteen countries covering cotton, wool and manmade fiber products. The terms of each of these agreements differ somewhat, but the rate of growth of exports from these countries to the U.S. typically is in the six to seven percent range for included products.

Excerpts of Exhibit 60

[p. 1]

STATEMENT OF HOVAN HOCUTT SENIOR VICE PRESIDENT, ENGINEERING PNEUMAFIL CORPORATION BEFORE THE PUBLIC HEARING CONCERNING THE PROPOSED CHANGES IN THE OSHA COTTON DUST STANDARD

My name is Hovan Hocutt. I have a Bachelor of Science degree in Aeronautical Engineering from North Carolina State University and I am a licensed Professional Engineer. I have 13½ years experience as factory engineer and officer of a woven asbestos brake lining factory where one of my responsibilities was the engineering control of asbestos dust. I am now Senior Vice President-Engineering of the Pneumafil Corporation, Charlotte, N. C. where I have been since 1950. Pneumafil Corporation was formed in 1946 to design and manufacture systems for the control of lint and dust in the textile yarn manufacturing industry. This has always been its primary business. We are in regular contact with leading manufacturers of cotton dust control systems in England, Germany, Switzerland, Hong Kong, Japan and other foreign countries.

In June of 1972, Pneumafil Engineers began work on NIOSH Contract HSM 99-72-44 to determine what engineering controls would be necessary to achieve a dust level of 0.5 mg/M^3 as measured by the vertical elutriator (VE) in the processing areas of opening, picking, carding, drawing and combing. Some investigation of dust capture devices and air quantities required to achieve 0.2 or 0.1 mg/M^3 VE was also included.

[18-19] * * *

6. Obviously, based on this factual data it is economically and technically unfeasible to achieve a raw cotton dust level of 0.2 mg/M³ VE $\overline{X}$ in processes past roving. Also, the capacity of the dust control industry is reflected by the total sales of $12 million which represents the largest sales year ever. At best, this capacity could increase approximately two to three times with the new demand. This means that if sales were to reach $30 million, it would take at least eleven years to supply the equipment necessary to reach a level of 0.2 mg/M³ VE $\overline{X}$ in opening-carding only.

COST/DOLLARS
COTTON DUST CONTROL SYSTEMS

Textile Process	0.5 Mg/M³ VE $\overline{X}$ Equip. Cost	Maintenance Cost/Year	Energy Cost/Year	0.2 Mg/M³ VE $\overline{X}$ Equip. Cost	Maintenance Cost/Year	Energy Cost/Year
Opening	6,256,388	133,312	589,963	25,818,973	262,852	1,190,900
Picking	21,914,519	397,241	2,254,650	42,762,527	542,545	3,346,151
Carding	29,337,703	672,046	3,751,459	121,868,495	1,527,603	10,541,040
Sub-Total	57,508,610	1,202,599	6,596,072	190,449,995	2,333,000	15,578,091
Drawing	13,697,778	132,622	1,368,075	44,212,483	411,112	5,000,936
Combing	—	—	—	6,874,565	67,848	813,529
Roving	5,412,737	52,754	528,683	37,169,720	429,793	4,088,148
Opening—Roving Sub-Total	76,619,125	1,389,781	8,492,830	278,708,763	3,241,753	25,480,704
				0.5 Mg/M³ VE X		
Spinning	13,517,498	379,803	1,582,088	13,517,498	379,803	1,582,088
Twisting	—	—	—	—	—	—
Winding	14,383,500	95,900	1,389,080	14,383,500	95,900	1,389,080
Spooling	2,965,900	21,188	327,485	2,965,900	21,188	327,485
Warping	—	—	—	—	—	—
Spinning—Warping Sub-Total	30,866,898	496,891	3,298,653	30,866,898	496,891	3,298,653
	1.0 Mg/M³ VE $\overline{X}$			1.0 Mg/M³ VE $\overline{X}$		
Slashing	—	—	—	—	—	—
Weaving	41,560,769	204,944	6,151,937	41,560,769	204,944	6,151,937
Total	149,046,792	2,091,616	17,943,420	351,134,430	3,943,588	34,931,294

These figures represent the estimated economic impact on the industry as of 2/11/77. The totals *do not include the following credits* allowed for dust control systems purchased by the industry before 2/11/77:

Towards compliance with 0.5 mg/m³ VE $\overline{X}$ standard-opening = $12,151,541, picking = $5,685,038, carding = $32,333,474, drawing = $210,441, Total = $50,380,494.

Towards compliance with 0.2 mg/m³ VE $\overline{X}$ standard-opening = $10,693,356, picking = $5,002,834, carding = $28,453,457, drawing = $185,188, Total = $44,334,835.

Excerpts from Exhibit 62

STATEMENT OF ARTHUR THOMAS
SENIOR VICE PRESIDENT
THE BAHNSON COMPANY
SUBSIDIARY OF ENVIROTECH CORPORATION
WINSTON-SALEM, NORTH CAROLINA
BEFORE THE PUBLIC HEARING CONCERNING
THE PROPOSED CHANGE IN THE
OSHA COTTON DUST STANDARD

* * *

ATMI ECONOMIC IMPACT STUDY

Estimated Temperature and Relative Humidity Compliance Cost (Dollars)

Dust Level mg/m³	*Textile Process*	*Equipment Cost*	*Annual Maintenance Cost*	*Annual Energy Cost*	*Operating Brake Horsepower*
.5 VE	Opening	9,311,460	163,103	336,438	4,172
.5	Picking	22,595,910	620,904	1,228,975	15,373
.5	Carding	28,515,838	635,404	1,853,548	23,673
.5	Sub-total	60,423,208	1,419,411	3,418,961	43,218
.5	Drawing	12,829,474	272,404	737,361	9,220
.5	Combing	—	—	—	—
.5	Roving	5,375,854	104,521	183,090	3,554
.5	Opening-Roving Sub-total	78,628,536	1,796,336	4,339,412	55,992
.5	Spinning	4,286,350	143,698	209,323	4,278
.5	Twisting	—	—	—	—
.5	Winding	5,283,507	164,371	210,252	4,297
.5	Spooling	1,210,988	33,890	43,303	885
.5	Warping	—	—	—	—
.5	Spinning-Warping Sub-total	10,780,845	341,959	462,878	9,460
1.0	Slashing	—	—	—	—
1.0	Weaving	24,098,472	723,621	1,984,909	28,306
	TOTAL:	113,507,853	2,861,916	6,787,199	93,758

NOTES

1) Equipment cost include air conditioning, 7½% consulting engineers fees, electrical wiring from main switch gear, and general construction of equipment rooms.

2) Maintenance cost are on air conditioning only and include spare parts, all calculated at 3½% of air conditioning cost.

3) Energy cost based on $116.50 per BHP per year (7200 hrs.). Air supply based on 100% operation for 7200 hrs. Refrigeration based on 60% operation for 7200 hrs. at an average load factor of 70%. ($116.50 × .60 × .70 = $48.93 per BHP per year).

4) The reason Opener & Picker Equipment Cost for .5 MG/M3 appear out of line with those cost for .2 MG/M3 is due to the reduced air quantity per mill costing more per C.F.M. and the reduced refrigeration tonnage per mill costing more per ton.

Exhibit 42

STATEMENT OF JACK W. WHITWORTH, M.D. MEDICAL DIRECTOR WESTPOINT PEPPERELL AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC. BEFORE THE PUBLIC HEARING CONCERNING THE PROPOSED CHANGE IN THE OSHA COTTON DUST STANDARD

My name is Jack W. Whitworth, and I am currently the Medical Director of WestPoint Pepperell. My statement will be primarily directed to our medical surveillance program, including its development, as it relates to the proposed standard on cotton dust.

I. DEVELOPMENT OF PROGRAM

In 1969 and 1970 we at WestPoint Pepperell became aware, from studies that were being carried out by various investigators such as Dr. Bouhuys and others, that there could be a correlation between cotton dust exposure and lung disease.

After corresponding with Dr. Bouhuys and searching the literature, particularly the British journals, we began to suspect that some of the pulmonary problems we had seen could represent symptoms of byssinosis. During the year 1970 a medical student was hired and trained to do pulmonary function tests. Some one thousand yarn manufacturing employees were tested and compared to some two or three hundred office workers, and we found that in fact there were some differences in lung function values in some individuals in the two groups.

The chronology of the development of our program from

this point was as follows:

1. Beginning in 1971-1972 dust level surveys were begun on a periodic basis-annually, or more often if a change in machinery and/or cleaning equipment occurred. Both personal and area samplers, including the vertical elutriator, were used.

2. Beginning in 1971, with more emphasis on pre-existing pulmonary problems such as asthma, allergies, more detailed pulmonary histories and pulmonary function tests were done as a part of preemployment examinations on prospective employees who were to work in areas where there was exposure to cotton dust. Potential risk employees were assigned to lower dust areas.

3. Beginning in 1971, before the development of our general medical surveillance program, registered nurses in each mill were taught the symptomatology of byssinosis and suspected cases were referred to the medical department for further evaluation and possible transfer to lower dust areas when indicated.

4. During 1972, in preparation for a general pulmonary survey, a slide presentation involving an explanation of byssinosis and reasons for upcoming pulmonary function tests, questionnaires, and chest x-rays was shown in each mill to the affected employees. We also published numerous articles in our company newspaper dealing with the subject.

5. In an effort to assure obtaining more consistent data, we elected to use a team approach to acquire pulmonary data. Accordingly, in 1972, five individuals were hired and trained in pulmonary function testing and instructed in giving the Modified British Research Council Respiratory Questionnaire (Schilling questionnaire).

6. We had some 9,000 employees at WestPoint Pepperell who were exposed to some concentration of cotton dust, and

in January of 1973 the team began a general pulmonary survey of this population. The surveillance program was carried out using standard procedures. A pre- and post-shift spirogram was done on Monday or first day back at work after an absence of approximately 40 hours from cotton dust exposure, using Jones Pulmonor II spirometers. The observed forced expiratory volume in one second (FEV_1) and forced vital capacity (FVC) were recorded in cc's, and using the Veterans Administration Cooperative Study (Kory) predicted volumes for age, sex, and height, the percent of predicted volume was recorded. The percentage (Δ) change between pre- and post-shift tests was figured. The standard questionnaire was administered during the same or the following week, and both the objective and subjective findings were keypunched for computer analysis. Byssinosis was graded, using the Schilling definitions of the grades of the subjective symptoms (historical byssinosis). Bronchitis, dyspnea, smoking, and chest illness were graded, using standard medically accepted definitions. Following the initial survey, those people with significant positive histories, low pulmonary function tests, and significant delta changes (10% loss or 15% gain) over the shift, were requestioned and retested. Some were retested on several Mondays or "first days back at work." The primary purpose for such retests was to try to establish the best individual baseline possible for future comparisons. Nevertheless, in a later discussion and analysis of the findings, only those responses obtained on the very first interview and pulmonary function tests done during the general surveillance program will be used. By this method we can maintain a credible epidemiological approach, so that a reasonable comparison can be made with other studies.

A respiratory protection program has also been adopted

by WestPoint Pepperell. High dust level areas have been designated by signs and employees working in these areas are informed that they will be furnished and required to wear respirators, either single use or replaceable cartridge type. Any person working outside these areas that so desires is also furnished a respirator free of charge. Explicit guidelines have been developed and furnished each affected employee.

II. ANALYSIS OF GENERAL PULMONARY SURVEY

In our first general pulmonary survey a total of 9,181 persons exposed to some level of cotton dust was studied. No one was excluded because of inability to perform perfect pulmonary function tests. Vigorous attempts to get the best possible data were carried out and most of the tests were felt to be reliable. We must remember, however, that for the great majority of the employees this was their first exposure to pulmonary function testing and it is well known that there is a learning curve for both the testors and those tested. In a continuing program such as this we do not have the luxury of being able to discard sub-standard tests, as is done in most epidemiologic studies. We got the best test possible and kept the results, because in the end we must be able to look not only at the group as a whole, but, for clinical purposes, at each individual as he or she progresses or degresses each year. I am convinced, as are most people who have ever done any pulmonary function testing, there is a very small percentage of individuals who will never be able to perform a completely satisfactory test. We must, however, keep the results for future comparison and hope that their same inconsistences are consistent each year. Then, at least we will be able to try to make some logical comparison. This is not said to excuse or defend a few poorer tests, but is a simple

statement of fact I am sure everyone has found in their initial surveys and is given as an explanation of why the pulmonary function test of each individual was included in our study. This will certainly make our findings look poorer, rather than better. The questionnaires were done without encouragement or discouragement by the individuals asking the questions, and only a simple explanation was given when requested and it was obvious that the question was not understood.

Of the 9,181 individuals studied, 124 or 1.35% gave positive answers to the questions related to byssinosis as graded by the Schilling method (Grade 1/2, Grade I, or Grade II). Of the 124 employees, 87 or 70.2% were Grade 1/2, 35 or 28.2% were Grade 1 and 2 or 1.6% (0.02% of all employees) were Grade 2. It must be stated and understood by everyone that we are talking here about *subjective* or "historical" symptoms. These classifications or grades by themselves are not, without more objective findings, indicative of any impairment or disability. This is particularly true in regard to Grade 1/2. In other words, a person can be in Grade 1 or 2 and have no objective evidence of disease. As was expected, the greater percentages of positive answers per number of people exposed per area were in yarn manufacturing (Opening thru roving) and this figure was 5.3%. Although spinning is considered a part of yarn manufacturing, it was separated for this analysis and showed 1.10% of positive symptoms. Yarn preparation (spooling, twisting, warping, and winding) showed 0.74%. Slashing and weaving showed 0.61%. Cloth inspection, shop (mechanics, electricians, etc., who work part of their time in the processing areas) and all others, showed 0.88%. These people were exposed to a wide range of dust levels from $< .2$ mg/M^3 to > 1 mg/M^3, as measured by

the vertical elutriator. Of the 1,120 employees working in yarn manufacturing (opening thru roving), 60 or 5.35% had positive responses to the questions relating to byssinosis. The mean dust level for each department was calculated and assigned the following ranges. The percentage of positive responses per number of exposed individuals in each range are as follows:

1. In dust levels from $<$ .2 mg/M^3 to .5 mg/M^3, 2.98% had positive responses.

2. In dust levels from .5 mg/M^3 to .75 mg/M^3, 5.4% had positive responses.

3. In dust levels from .75 mg/M^3 to $>$ 1 mg/M^3, 7.14% had positive responses.

Of the total number of employees (124) with positive symptoms in the entire survey, 60 or 48.38% were found in yarn manufacturing. Of these 60 individuals found in yarn manufacturing, 40 or 66.6% were Grade 1/2. Further, of those 60 individuals, 34 or 56.6% were in dust levels above 0.75 mg/M^3 and 26 or 43.3% were in levels below 0.75 mg/M^3.

Even though the population (1,120) in yarn manufacturing represents only 12.19% of the total survey population (9,181), we must recognize that this is the area of our primary concern. Our data showed that the majority of the individuals in Grade 1 were in yarn manufacturing. Therefore, in a medical surveillance program, particular emphasis should be given these areas, especially those with dust levels over 0.75 mg/M^3. So that no confusion or misunderstanding will arise regarding the 0.75 mg/M^3 dust level just mentioned, it must be understood that this is not recommended as the permissible exposure limit nor do we believe it to be the exact dose-response level. It is intended only as a point in the yarn manufacturing area at which medical

surveillance should receive more emphasis. We do not know the exact dose-response level nor does anyone else. Our study has the same inherent weakness in regard to dose-response predictability that all others have—dust levels prior to the study are unknown for those individuals who have subjective and/or objective byssinotic symptoms.

When equivalent dust level ranges in spinning are compared to those described in yarn manufacturing, the percentage of positive responses diminish greatly:

1. In dust levels from $<$ 0.2 mg/M^3 to 0.5 mg/M^3, 1.03% had positive responses.
2. In dust levels from 0.5 mg/M^3 to 0.75 mg/M^3, 1.41% had positive responses.
3. There were no dust levels above 0.75 mg/M^3 in spinning.

When equivalent dust ranges in yarn preparation (spooling, winding, twisting, warping) are compared to those described in spinning, the percentage of positive byssinotic symptoms diminish even further:

1. In dust levels from $<$ .2 mg/M^3 to .5 mg/M^3, 0.50% had positive responses.
2. In dust levels from 0.5 mg/M^3 to 0.75 mg/M^3, 1.36% had positive responses.
3. In dust levels from .75 mg/M^3 to $>$ 1 mg/M^3, 1.07% had positive responses.

Because of the abundance of starch in the atmosphere and the very low percentage (0.61%), of positive responses throughout weaving and slashing (0.6%), it was felt that no good comparison could be made except as a whole.

These data show that at some dust level between 1.0 mg/M^3 and .5 mg/M^3 of cotton dust the percentage of positive responses to the questions related to byssinosis drops sharply. These percentages are lower than those reported

in some other studies, but they accurately show the findings of our initial survey and it is our belief they more accurately represent the actual conditions.

As for objective finding or pulmonary function test results on the initial survey, 1,085 of the 9,181 or 11.8% showed a 10% Δ change or loss in FEV_1 comparisons between pre- and post-shift spirograms. The average FEV_1 % of predicted volume for the 9,181 employees was 86.5%. The average FVC % of predicted volume was 88.7%. We have approximately 40% black employees in our working population, and no correction factor for race was used at this point in time. Had the accepted correction factor of 12% to 15% been applied to the predicted volumes, these percentages would have been considerably higher. Moreover, as no individuals were eliminated because of substandard tests, these figures, on an epidemiological basis, would have been even higher.

On the initial survey the number of employees with a significant Δ % change over the shift was higher in (a) yarn manufacturing (opening thru roving) than in (b) spinning and the following operations. On repeat tests the percentage of employees with repeated significant Δ % changes in (a) and (b) dropped considerably (11.8% to 7.0%), but the ratio between (a) and (b) remained approximately the same. We believe the causes for these significant decreases in total percentages are improvements in testing techniques, and learning curves on individuals being tested. However, we also believe that portions of such decreases are because of improved work practices, improved cleaning systems, etc.

The most provoking aspect of the whole analysis has been the lack of correlation between subjective and objective findings. This, of course, is not a new thing and has been discussed in numerous articles. No totally complete explana-

tion has ever been given to our knowledge. The correlation between individuals who have both subjective or historical symptoms and objective or significant pulmonary function decrements in △ percentages (10% drop or more), has been less than 1% of the total population. Of the 6% who had significant △ changes (10% drop), only 10% also had positive questionnaires. Of the 1.6% (retest) who had positive questionnaires, only 30% had significant △ changes.

In the subsequent retests, both subjective and objective, the number of employees showing positive response to the questions on chest tightness or breathlessness contained in the questionnaire (Schilling Grades 1/2, 1, 2) have increased slightly, but the number of employees with significant 10% △ changes has decreased very significantly. On the initial survey the percentage was 11.8%. On followup, the percentage dropped to approximately 7% of the total population. There was a slight increase in the number of positive subjective or historical grades (1.35% to 1.60%). We feel that this was due to better understanding of the questionnaire or, in some cases, a conditioned response.

A conditioned response is defined as a situation in which answers to a questionnaire are exaggerated or understated because of reasons not related to health conditions. For example, an employee positively responds to the questionnaire in order to be subject to transfer.

We feel that Grade 1/2 byssinosis as defined by Schilling ("occasional chest tightness on Monday") is very tenuous and fuzzy to interpret at best. Textile workers smoke considerably more on the weekend and along with other weekend situations makes for having unrelated Monday symptomatology. In fact we have never been able to correlate Grade 1/2 consistently with anything and we think

erroneous analyses and diagnoses arise because of the vagueness of the Grade 1/2 definition.

III. DEFINITION OF COTTON DUST TOO BROAD

"Any dust" in a textile plant is not necessarily of cotton origin and should not be so broadly classified. For instance, we know in a weave room the dust level is primarily starch. In spinning we see typical dust levels of .2 mg/M^3 to .3 mg/M^3, and yet in the subsequent process—weaving—the dust levels may be .5 mg/M^3 to .7 mg/M^3. We know no one has dumped additional cotton dust in the weave room; therefore, the additional component in weaving has to be starch. It is a fact that the incidence of subjective byssinotic symptoms in the weave room is extremely low, and is lower (0.6%) than that found in any other area of yarn manufacturing and yarn preparation. In view of these facts, weave rooms and cloth inspection rooms should be allowed higher levels.

IV. RELEVANCE OF THE QUESTIONNAIRE AND PULMONARY FUNCTION TEST EVALUATION AS OUTLINED IN THE STANDARD:

There is no question that a questionnaire has some value as a diagnostic tool, but it has been recognized for some time that the most commonly used questionnaires in textile surveillance programs (Modified Research Council or similar) are subject to lack of uniformity in response. Some employees tend to minimize or exaggerate symptomatology. This may be done for a number of reasons. In order to achieve more consistent and open responses, we decided to try to develop an improved questionnaire. In 1975 we contacted Dr. Hans Weill of Tulane, and in a joint effort developed a modified questionnaire, which in our opinion, has definite advantages over the one in the proposed standard. We are

in the process of using this questionnaire now and hope to have a better evaluation of its results in the near future. We will be happy to share this questionnaire with OSHA for possible general recommendation.

Regarding pulmonary function evaluation, we feel that a 5% Δ change in FEV_1 over the shift as being significant is too stringent. It is our understanding that most ordinary spirometers are allowed a 2% degree of variance within the spirometer itself. This leaves only a 3% variation tolerance for the testor and the individual tested; and, we would feel confortable in saying that there is no pulmonary function team in existence that can repeatedly test to such degrees of accuracy. We have tested many individuals on several different Mondays under similar circumstances and sometimes they will have a 10% Δ change and sometimes they will not have any change. We are not certain that these individuals are true reactors. If they repeat the drop on several Mondays, this leaves less doubt. To our knowledge, there is no hard evidence that moderate reactors are at higher risk than nonreactors. We believe that the real emphasis should be placed on getting the best pre-exposure baseline pulmonary function tests possible, and comparing these results with succeeding pre-exposure results on a periodic basis. This is where the real proof lies.

Under the section on medical surveillance in the proposed standard, many statements are made which are ill-defined and unnecessary. The requirement that an individual with an FEV_1 of less than 80% predicted volume and a single delta change of 5%, be provided medical surveillance every six (6) months is unnecessary. With the test-retest variability, the idea of one 5% delta change over a shift requiring permanent placement of an individual on a six-month list has little validity and, if implemented, will cause

many unnecessary retests. Suppose this individual has a 0% delta change or a delta 5% increase in his next subsequent test. Do you continue to monitor this individual every six months or was the individual never a pulmonary function reactor?

The same section requires repeat testing every six months on an individual who has FEV_1 of 79% of predicted volume. Most surveillance teams use the Veterans Administration Cooperative Study (Kory) nomograms to compute the percent of predicted volume. There are many normal individuals not employed by the textile industry, as well as many employed by the textile industry, whose FEV_1 is 75% to 80%, and even 79%, or predicted volume using the Veterans Administration (VA) nomogram. The VA nomogram, however, admits to a standard error of estimate (SEE) as large as 0.52 liters on an FEV_1 prediction. Thus, at the very least, individuals whose FEV_1 was 75% to 80% of predicted volume in pre-employment testing, who had no history of asthma, allergy, chronic bronchitis, and who had not developed such history during their employment should have to be retested every six months if there is no change in their FEV_1 as their FEV_1 is clearly within allowance provided by the standard error of estimate. With the level of test—retest variability, we recommend that the level of significant Δ change be set at 10% and more emphasis be placed on annual decline rates.

V. PERMISSIBLE EXPOSURE LIMITS

In our opinion, the permissible exposure limits of 0.2 mg/M^3 is totally unnecessary. Our initial pulmonary survey data shows that the highest prevalence rate of positive byssinotic symptoms was found in yarn manufacturing. All other studies, to our knowledge, show similar findings. However,

our data presented here show a drop in occurence of positive byssinotic symptoms between 1.0 mg/M³ and 0.5 mg/M³ of cotton dust as measured by a vertical elutriator. In the area of most concern, yarn manufacturing, at a level of 0.5 mg/M³ of cotton dust, the percentage of positive symptoms was quite low.

As expected, our data show that the percentage of positive byssinotic symptoms are higher where the *cotton* dust levels are higher. However, our data also shows the percentage of positive byssinotic symptoms diminished considerably when equal cotton dust level ranges are compared in the progressive steps of the manufacturing process. We know that the dust level is inflated with starch in the slashing and weaving areas, but there are only minor dilution factors between carding and slashing except the man-made airborne fiber in blend mills. It would appear that the more active material is knocked out early in the yarn manufacturing area. A probable explanation for this phenomenon is that in the yarn manufacturing process most of the bract, leaf, and stem particles are separated from the cotton fiber and deposited or left in this area. As the later yarn manufacturing and yarn preparation processes speed up, a larger number of small, broken, fibers are slung out in the processes and are picked up by the vertical elutriator, adding significantly to the sample weight. Many investigators believe that the active agent in cotton dust is found exclusively in the bract, leaf and stem parts of the cotton plant, and that the lint or fibers do not contribute to any biochemical response in the lung. The addition of these small, micron size, non-active, broken lint fibers to the atmosphere may add to the sample weight, but not to the biologic activity of the dust.

Our data presented here show that at some level of cotton

dust between 1.0 mg/M³ and 0.5 mg/M³, as measured by the vertical elutriator, the percentage of positive byssinotic symptoms diminishes. At a level of 0.5 mg/M³ of cotton dust, the percentage of positive byssinotic symptoms is extremely low. With a good medical surveillance program, we are confident that those individuals with byssinotic symptoms can be positively identified, carefully monitored, and therefore be protected from symptom progression with use of respirators and/or transfers to lower exposure areas. A good pre-employment appraisal with particular emphasis on evaluation of pre-existing pulmonary problems such as asthma, allergies, chronic bronchitis, smoking habits, etc., along with careful pulmonary function testing is essential in a medical surveillance program. This allows for pre-placement of potential risk employees in low risk areas and certainly will diminish the number of people who become early reactors. A continuing medical surveillance program will then identify the few who develop any early reactivity over several years and allow for their protection prior to developing any permanent changes in their lungs. It should be emphasized strongly that early reactivity is reversible and not a permanent change.

Therefore, we recommend that the standard not be lower than 0.5 mg/M³ as measured by the vertical elutriator, and that respirators should not be required below this level except in those few individual cases identified as potential risks by subjective and/or objective symptomatology.

VI. CONCLUSION AND SUMMARY

1. "Cotton dust" as defined in the standard should be more meaningfully and more accurately defined.

2. The MRC questionnaire as outlined in the proposed standard should be reappraised and modified.

3. The 5% Δ change in FEV_1 proposed as significant in the standard, should more realistically be 10% and greater emphasis should be placed on observing the annual decline rate in FEV_1.

4. The proposed permissible exposure limit of 0.2 mg/M^3 is unnecessary to adequately protect individuals exposed to cotton dust, for a permanent permissible exposure limit of 0.5 mg/M^3 would provide adequate protection when coupled with monitoring and a thorough medical surveillance program.

5. The permissible exposure limit for cotton dust in slashing and weaving should allow for the abundance of airborne starch and other elements in the environment and, thus, should be considerably higher than in other areas.

Exhibit 47

STATEMENT OF HAROLD R. IMBUS, M.D., Sc.D. MEDICAL DIRECTOR, BURLINGTON INDUSTRIES, INC. AT THE PUBLIC HEARING ON THE PROPOSED STANDARD FOR EXPOSURE TO COTTON DUST

I am Dr. Harold Imbus. I am Medical Director of Burlington Industries. I joined the Company slightly over seven years ago and since that time I have been deeply involved with the Company's respiratory surveillance program. The Company's program has consisted of several aspects, namely:

1) Research and cooperation with universities, government agencies, and others, about the nature, incidence, and correction of the byssinosis problem.

2) An on-going medical surveillance program which involves testing of employees and prospective employees in plants where cotton yarn is spun.

3) An extensive program of dust monitoring.

4) A program aimed at lowering dust levels and exposure by engineering controls, work practices, and respirators.

My primary emphasis here will be on the medical surveillance program and results thereof because it is the area that I have dealt with mostly. In the other aspects the Company has an extensive capital improvements program to control dust. Further, our Dr. Moon Suh will discuss some research and statistical aspects of prevalence of the symptoms of byssinosis and Dr. John Neefus from Burlington Industries will discuss some aspects of environmental monitoring.

Our medical surveillance program primarily consists of 1) pulmonary function testing and 2) questionnaires, on a

yearly basis, for all employees, and prior to the time of employment for applicants. Employees of special concern after this testing are referred to independent medical consultants for evaluation and recommendations. We have approximately 12,500 employees included in the program who are tested each year, in addition to preemployment testing of applicants, and have administered well over 100,000 tests since the beginning of the program in 1970. Testing and minor counseling is performed by the plant nurse. Cases of more concern are seen by a member of the corporate medical staff in Greensboro. To date, over 3,000 such individual interviews have been conducted by our corporate staff. Three hundred sixty-seven (367) of these individuals have been referred to independent consultants.

In our original study [1] we found 460 out of 10,133 employees or 4.5% who complained of the Monday chest tightness which defines the byssinotic reactor under Schilling's definition. It should be emphasized that these were individuals complaining of tightness in the chest on Monday and were not necessarily disabled or impaired—in fact, the majority of these individuals were not impaired or disabled. In addition, we found substantial declines for a number of employees in the one second forced expiratory volume (FEV_1) from the beginning to six hours after the beginning of the shift. As the study indicates, a significant number of employees showed the symptoms of being byssinotic reactors based on their answers to the questionnaire and there was evidence of substantial pulmonary function reactivity in the various departments.

Table 1 illustrates some of the progress that has been achieved as a result of our program. In our 1976 survey, we had 136 employees or slightly more than one percent (1.0%) complaining of the Monday tightness of byssinosis

reaction versus the 4.5% in 1971. In 1976, the average change in FEV_1 from before to during the shift for all tested employees was 0.00% versus —1.7% in 1971. For preparation areas in 1976 it was —0.54% versus —3.9% in 1971. Similar improvements are observed in yarn production, slashing, weaving and other areas. In 1971, approximately 18% of our employees tested showed a drop in their FEV_1 of 10% or more. In 1976, that figure was 7.4%, which is about the same as the number whose FEV_1 increased by a similar amount. I might add that our figures in respect to FEV_1 drop of 10% or more tend to be somewhat higher than others since we do not eliminate unsatisfactory results from our composite reporting as is customary in most research or epidemiological studies.

Dust reductions have helped. However, these marked improvements in symptoms and functional readings have been achieved in the face of the fact that only 28% of our areas (in most naturally low dust operations such as roving through spooling of blends) are at or below .2 mg/M^3, while 38% are between .2 mg/M^3 and .5 mg/M^3 and 34% are still above .5 mg/M^3. As we bring all yarn production areas to .5 mg/M^3 or below in coming months it is my opinion that there will be very few reactors left at all.

In addition to improvement brought about by lowering of dust levels, we believe that considerable improvement has been accomplished by:

1) Placement of healthy employees in cotton operations.

2) Transfers where feasible.

3) Wearing of respirators for susceptible employees and those working in the higher dust levels.

4) Counseling with employees regarding smoking, and early identification of and getting employees with early chronic lung disease under a program of care.

Byssinosis can and does result in chronic obstructive lung disease. We have certainly found evidence of this in our own Company and have reported so. However, if byssinosis resulting in chronic obstructive lung disease were as rampant as some lead us to believe, one would expect evidence of a very high incidence of chronic obstructive lung disease in the U.S. cotton textile industry. We have considerable evidence to the contrary. Dr. Hans Weill [2] in a Tulane University study of several textile mills concluded "no excess of chronic obstructive pulmonary disease was detected in this population as indicated by low bronchitis prevalence and baseline pulmonary function measurements which compare favorably with expected values."

We have evaluated our results and have compared them with a study of an unpolluted Colorado city [3]. In that study, criteria of chronic obstructive lung disease was an FEV_1/FVC ratio of less than 60%. In the Colorado study, the overall incidence of chronic obstructive lung disease in 609 persons was 6.8%. The comparable figure in 12,519 Burlington cotton plant employees in 1976 testing was 2.4%.

I know that there are individuals who have serious chronic obstructive lung disease who have worked in cotton textile mills. One tends to assume the relationship between their work and their disease. This may or may not be so. One need only visit a respiratory clinic, however, to find many people suffering from a terrible disease, obstructive lung disease, which has reached epidemic proportions in our country. These people are from all walks of life, many who have never worked in a cotton mill and many who have lived and worked in nondusty environments. I make these remarks to in no way minimize the importance of byssinosis, but to put it in perspective.

The proposal for a .2 mg/M³ or lower permissible exposure limit for cotton dust is based to a large extent upon the study done by the Duke/State of North Carolina [4] group which indicates that allowance of the .5 mg/M³ level is tantamount to allowing 26% of the employee population to develop symptoms of byssinosis, with for a .2 mg/M³ level, the comparable figure of approximately 13%. It must be remembered that these figures are for historical byssinosis which is based solely upon Monday symptoms which are determined solely by a positive subjective response to a questionnaire, and do not indicate irreversible disease.

Let us look at the results of some other studies. I have already mentioned our data with respect to past and present prevalence. Dr. Moon Suh expands on this discussion in his statistical analysis which reveals a 6% prevalence of historical byssinosis symptoms as determined by questionnaire at .5 mg/M³.

In the textile manufacturing industry, several companies with active medical programs pooled data on the incidence of historical byssinosis (Grades 1/2, 1 and 2) on initial surveys. This represented an original questionnaire survey of 41,283 employees. Table 2 summarizes the findings. Overall incidence of all grades was 1.79%. The highest overall percentage incidence was in preparation (opening through roving), 4.3%. In not all cases were dust levels done at the time of the medical survey; however, it was possible to assign dust levels for approximately half, or 20,027, of these employees. Of these, 6,855 employees were working in dust levels above .5 milligram per cubic meter. Overall incidence was 3.17% byssinosis symptoms for this group, with the highest incidence, 31.9%, in drawing, and an average of 11.29% for 1,488 employees working in preparation. Weaving, which represented 4,265 of these employees,

had an incidence of 0.6%. Another group of 13,172 employees worked in dust levels at .5 milligram and below. Overall incidence of all the historical byssinosis for this group was 1.32%, with approximately 14% in roving and averaging 4.41% of 1,566 employees in opening through roving. Incidence in weaving was 0.7%. A third group of 21,256 employees for whom no dust level was assigned had an incidence of all grades historical byssinosis of 1.63%. Highest incidence was 5.1% in the opening and picking area, with an average of 2.38% of 5,537 employees in opening through roving. There was an incidence of 1.4% in weaving. Three thousand five hundred thirty-eight (3,538) of these 41,000 employees showed a drop in FEV_1 of 10%, or a total of 8.57%. More detailed summary of individual work areas is submitted in an Appendix to this report.

A survey done by the ATMI in December, 1976 revealed that approximately 150,000 textile employees work in areas where they might be exposed to raw cotton dust. The survey which I have just cited of approximately 41,000 employees, therefore, represents over one/fourth of this population. Projecting the 1.79% of these employees to the U.S. cotton textile employment of 150,000 reveals that approximately 2,700 employees would be expected to have subjective symptoms of byssinosis, that is, Monday tightness. It is obvious from these figures that some of the projections by whatever means measured have been grossly exaggerated. Now, the above data indicates that, even after combining all those exposed to .5 mg/M^3 and more, the employees with a potential problem are less than one/third of those projected by the Duke/State of North Carolina study at .2mg/M^3. Thus, I think it would be helpful here to review some of the various studies on a number of other investigators.

The NIOSH "Criteria for a Recommended Standard-Oc-

cupational Exposure to Cotton Dust" reviews findings of various investigators with respect to correlation of cotton dust exposure and incidence of historical byssinosis. Most investigators have found an association between dustiness and incidence; however, to quote the document, "the slopes of the prevalence dustiness curve obtained by different investigators vary considerably." Thus the studies of Merchant [4] et al. and Molyneux and Berry [5] report prevalence of 13% and 10% at .2 mg/M³ and 26% and 40% at .5 mg/M³, respectively, while those of Fox [6] report a prevalence of 6% at .5 mg/M³, and a 40 year expected prevalence of 10% at .5 mg/M³. Our own studies revealed marked differences in prevalence per given dust level in various plants. Also, generally a tendency to have higher prevalence per unit amount of dust was found in the preparation areas, versus the yarn processing areas; more where coarser cotton versus finer cotton is used, and more where all cotton versus cotton/synthetic blend is used.

Work reported subsequent to the publication of the Criteria Document includes that of Noweir [7] who found a prevalence of 7.1% historical bissinosis among 506 cotton textile workers where respirable dust levels ranged from .10 to 2.35 mg/M³ but were mostly above .26 mg/M³. More recent work done in Australia by Barnes and Simpson [8] indicates a prevalence of 2.4% of 493 workers, though levels did reach up to 8 mg/M³ *total dust*. The authors seemed surprised that they were not able to find a higher incidence after having read the American and British literature.

The point that is made by a comparison of the different results of these different investigators is that there is no dose-response curve applicable to the textile industry per se; that dose-response varies in many different situations. There-

fore, any attempt to extrapolate from dose-response data of a single investigator and apply it to the American Textile Industry is simply not valid. Moreover, all studies suffer from the same failing as far as determining a dose-response curve is concerned—there was absolutely no data which was available which showed the dust levels to which employees were exposed *prior* to the study.

Burlington Industries made its plants available for study of the byssinosis problem by the investigators from Duke and the State of North Carolina. It is this study which is widely cited as the reason for the proposed .2 mg/M^3 standard. Summary and individual results were given to our medical department for follow-up. After it was determined by the investigators that byssinosis did exist in our plants, we established an annual pulmonary function questionnaire screening program so that individual employees could be evaluated. This, therefore, offered opportunity for comparison of our results with the investigators'. Table 3 presents the comparative results of two plants used for illustrative purposes.

The results presented from Plant 1, which was a very dusty plant, are not entirely comparable in that steaming experiments had been done in this plant. However, steaming was stopped prior to widespread equipment changes which resulted in lower dust levels. Prior to these changes we took a survey of the day shift employees. As you can see, overall, we found 17% incidence of symptomatic byssinosis versus 27% from the Duke/State of North Carolina investigators. Actually, in preparation area our findings were 30% versus their 41%. Though there were some differences, we do not feel they were striking or not readily explainable by possible changes in personnel, equipment, survey technique, etc. These results are published in the *British Journal of Indus-*

trial Medicine [9].

The case with Plant 2 is entirely different. In 1971, the Duke/State of North Carolina group found 19.5% historical byssinosis in the preparation area and a total of 6.2% throughout the plant. Subsequent surveys performed by us revealed 0 percent byssinosis. Our first reaction of course was to question our own techniques to see that questionnaires were being properly administered. However, in subsequent years, the results were the same. This plant has remained essentially unchanged since the original survey and has dust levels in the .4 to .6 mg/M^3 range. In contrast to the first plant, it is a blend plant.

We were somewhat concerned about the wide disparity that the different investigators obtained in this plant, while on the other hand, there did not seem to be such a glaring difference in the other plant (Plant 1). We reviewed the results given to us by the Duke/State of North Carolina group and found that in the first plant, the Plant 1, only 44% of the cases were diagnosed as being Grade 1/2, whereas in the Plant 2, seventy-one percent (71%) were Grade 1/2.

I believe that the use of Grade 1/2 pooled in with the percentages of those having historical byssinosis as a means of arriving at a dose-response curve has severe limitations. We feel that the validity of such dose-response curves and their validity as a means of setting a standard are open to challenge. Grade 1/2, in our experience, has not been very reproducible, even with the same investigator, and has been open to wide variations of interpretations by different investigators. Furthermore, it is a projection of such investigation as done at the Plant 2 onto a nation wide basis that leads to the erroneous assumption that many thousands have byssinosis.

In addition, we were able to take some of the cases who had been diagnosed as having byssinosis at Plant 2 original study and refer them to Dr. Mario Battigelli for evaluation. He will report on his negative findings of byssinosis in this testimony.

Another question I would like to deal with is the question of reversibility of byssinosis. When we see figures of incidence of byssinosis, for example, 25% in certain areas, it is natural to assume that this represents one/fourth of the people having significant illness. I believe we would all agree that these people are at increased risk of illness when they develop this periodic chest tightness and/or pulmonary reactivity. However, many of these people exhibiting this are not in any way ill. The question arises, can you detect these people at a substantially early stage to keep them from developing significant irreversible lung disease from their cotton dust exposure. We think we can and we have several tools in order to do this:

1) The questionnaire - periodic chest tightness. Although all our experience and data indicate little confidence in the Grade 1/2 or occasional byssinotic symptoms, the consistent complainer of a Grade 1 or 2 symptom as defined by questionnaire has, in our experience in many cases, been quite reliable.

2) Pulmonary function reactivity, that is a decrement of FEV_1 of 10% or greater is also an indicator. We do not believe that a single drop of this magnitude, but a consistent demonstration of such drop, would be a hallmark of a possible future problem.

3) Finally, and apparently ignored in the proposed standard, is serial determinations of pulmonary function, that is following people from year to year and determining whether they are losing pulmonary function at a faster rate

than they should. We believe that with proper utilization of these three tools it is unlikely that an employee will suffer damage from cotton dust without early detection.

However, one major factor must be recognized. Approximately 50% of our employees smoke. Smoking is associated with chronic obstructive lung disease which pathologically is indistinguishable from the chronic bronchitis of byssinosis. Studies have revealed general incidence of chronic obstructive lung disease of 10-20%, or more. Therefore, we are going to have chronic obstructive lung disease, completely unrelated to byssinosis, no matter what we do. However, we believe that our program can in the long run substantially reduce this. We have been able to get a number of employees to stop smoking, to have better habits of care and to be detected at an early stage wherein they would not be otherwise. The average chest physician who sees a case of chronic obstructive lung disease sees it at a very late stage. It is therefore our policy to refer an employee working in cotton dust to a chest physician, at company expense, when he is exhibiting signs of developing chronic obstructive lung disease regardless of the suspected etiology.

I would also like to comment on several other aspects of the proposed standard. Compulsory wearing of respirators above .2 milligram would in my opinion be disastrous to employees, to companies and to OSHA. Well over 100,000 textile workers would be in respirators. What is so tragic about this is that it is not necessary. There are literally thousands of employees working in dust levels between .2 and .5 mg/M^3 who are showing no effect day in and day out. To require them to wear respirators because of an arbitrary number would just not be fair to them. We concede that there would be some level above which you must protect all employees, even at the risk of protecting some who may not

need it. This should be kept to a minimum. We would suggest .5 mg/M^3 for such a level, and would suggest compulsory wearing of respirators for reactor employees below .5 mg/M^3.

It is difficult for me to understand why OSHA precludes the use of the single use respirator, particularly as NIOSH has approved their use. Two of these in particular now on the market are proven effective. Others in testimony here also indicate their effectiveness. It is very true that improper wearing of these respirators, breaking of straps, etc. can obviate their effectiveness. However, a protective device which is best is the one that is worn, and these are more apt to be worn than the very uncomfortable permanent respirators that are proposed in the standard.

Another problem that I notice with the proposal is Section H(5)(i)(A). Requiring a physician's written opinion for each employee is an extremely difficult requirement. I believe that most authorities in this field agree that paramedicals, that is, trained nurses and others can administer these examinations. We all agree that they should be under general supervision of a licensed physician, preferably one experienced in this field. However, there is no need for the physician to see every employee, and to require the physician to provide an individual written opinion with respect to an employee that he has never seen, places him in considerable jeopardy from a medio-legal standpoint, and also provides a great deal of administrative difficulties. We operate cotton plants in six states and we train our nurses in our program. We supervise carefully by periodic visits, quality control, immediate availability of consultation by telephone, etc. However, to have a physician write a note for each employee in each of these states would be administratively and legally not feasible. We could not expect to rely upon local physicians to provide this service. I believe

with the current malpractice situation, they would be reluctant. They certainly are too busy doing other more productive work to get involved with additional unnecessary paper work.

I would like to make one last comment which concerns the OSHA definition of cotton dust. OSHA is faced with a difficult problem here since the causative agent is not known and since there are no practical field methods for differential analysis between the dust that is generated from cotton itself and other types of dust such as from air pollution, synthetic dust, size, etc. I can concur with the practical utilization of the OSHA definition. However, if one is to use a definition, then one must set reasonable dust level standards.

For example, it is not unusual, as OSHA has indicated the Preamble to the Standard, to have community dust levels approaching .1 milligram per cubic meter. A standard therefore of .2 mg/M^3 may be represented by half dust not generated from the process itself. Likewise, in weaving, a large percentage of the dust would be due to sizing. Therefore, OSHA's definition is only logical to use when relatively achievable total airborne dust levels are set as the standard; in this case for most applications, with the exception of weaving, .5 mg/M^3. For a standard as low as .2 mg/M^3, I would consider it absolutely necessary to revise this definition to make correction factors for the presence of synthetic, size, and community dust levels.

In conclusion, I believe that there is a problem of byssinosis in the United States. It is my opinion, based upon our experience, that a standard is needed for respirable dust levels. The standard should include control of dust levels. In my opinion, a level of .5 mg/M^3 combined with an active medical surveillance program and a program involving transfers, respirators, counseling, and assistance to the susceptible employee would be appropriate, generally achiev-

able and protective of the employee. The standard should be somewhat higher in weaving. The cotton dust standard has been a most difficult one for OSHA to develop and will present additional difficulties after weighing all of the evidence presented at this hearing.

REFERENCES

1. Imbus, H.R., Suh, M.W.: Byssinosis—A Study of 10,133 Textile Workers. Arch Environ Health 26:183-91, 1973.

2. Weill, H.: Report to the American Textile Manufacturer's Institute on a Study Entitled Assessment of Respiratory Response in Textile Workers Exposed to Low Levels of Cotton Dust. Tulane University School of Medicine, May 31, 1976.

3. Mueller, Robert E., Keble, David L., Plummer, Jerry, Walker, Strother H.: The Prevalence of Chronic Bronchitis, Chronic Airway Obstruction, and Respiratory Symptoms in a Colorado City: Amer. Rev. Resp. Dis., Vol. 103, pp. 209-228, 1971.

4. Merchant, James A., et al.: Dose Response Studies in Cotton Textile Workers. J. Occ. Med., Vol. 15, No. 3, March, 1973.

5. Berry, G., Molyneux, M.K.B., and Tombleson, J.B.L.: Relationships Between Dust Level and Byssinosis and Bronchitis in Lancashire Cotton Mills. Br. Ind. Med., 31, 18-27, 1974.

6. Fox, A.J., Tombleson, J.B.L., Watt, A., Wilkie, A.J.: A Survey of Respiratory Disease in Cotton Operatives—Part II. Symptoms, Dust Estimations and the Effects of the Smoking Habits. Br. J. Ind. Med., 30:46-59, 1973.

7. Noweir, M.: Epidemiological Studies in Cotton and Flax Industries. High Institute of Public Health, University of Alexandria, Alexandria, Egypt, U.A.R. The American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1975.

8. Barnes, Robert, Simpson, G.R.: Variations of Pulmonary Function Amongst Workers in Cotton Mills. J. Occ. Med. Vol. 18, No. 8, August, 1976.

9. Imbus, H.R., Suh, M.W.: Steaming of Cotton to Prevent Byssinosis—A Plant Study. Br. J. Ind. Med. 31:209-219, 1974.

TABLE 1

	1971					1976				
	Prepara-tion	*Yarn Produc-tion*	*Slash Weave*	*Other*	*Total*	*Prepara-tion*	*Yarn Produc-tion*	*Slash Weave*	*Other*	*Total*
Number	1126	2642	2402	2015	10,133	1889	3682	4295	2653	12,519
Byssinosis %	18	3.7	2.1	1.8	4.5	3.65	0.95	0.44	0.53	1.09
△ FEV $_1$% (After—Before)	−3.9	−1.5	−1.5	−1.0	−1.7	−0.54	−0.18	+0.09	+0.45	0.00

TABLE 2

TEXTILE INDUSTRY RESPIRATORY SURVEY OF 41,283 COTTON TEXTILE EMPLOYEES

	No. Employees	*Byssinosis (All Grades)* *No.*	*%*	*Δ FEV₁ > 10%* *No.*	*%*
All Employees	41,283	737	1.79	3,538	8.57
Preparation (opening thru roving)	8,591	369	4.30	886	10.31
Dust Level Assigned	20,027	391	1.95	1,623	8.10
> .5 mg/m³	6,855	217	3.17	778	11.35
Preparation only					
> .5 mg/m³	1,488	168	11.29	337	22.65
≤ .5 mg/m³	13,172	174	1.32	845	6.42
Preparation only					
≤ .5 mg/m³	1,566	69	4.41	144	9.20
No Dust Level Assigned	21,256	346	1.63	1,915	9.01
Preparation only	5,537	132	2.38	405	7.31

TABLE 3

COMPARISON OF FINDINGS OF PREVALENCE OF BYSSINOSIS OF DIFFERENT INVESTIGATORS IN TWO BURLINGTON INDUSTRIES PLANTS

Figure in [ ] is Number

	Plant 1 *% Byssinosis by Area* *Duke/N.C.*		*B.I.*	
Preparation	41	[112]	30	[33]
Yarn	21	[245]	10	[67]
Total Yarn + Preparation	27	[357]	17	[100]

	Plant 2 *% Byssinosis by Area* *Duke/N.C.*		*B.I.*		*W. Virginia*	
Preparation	19.5	[41]	0	[32]	0	[41]
Yarn	1.9	[159]	0	[101]	0	[86]
Total Preparation + Yarn	5.5	[200]	0	[133]	0	[127]
Total Including Weaving	6.2	[340]	0	[264]	.45	[449]

Exhibit 63

STATEMENT OF JOHN P. FIGH VICE PRESIDENT AND TECHNICAL DIRECTOR TEXTILE INDUSTRY CHASE MANHATTAN BANK, NEW YORK BEFORE THE PUBLIC HEARING CONCERNING THE PROPOSED CHANGE IN THE OSHA COTTON DUST STANDARD

My name is John P. Figh and I am Vice President and Technical Director, Textile Industry, at the Chase Manhattan Bank, N.A. I have spent twelve years with Chase Manhattan as the textile consultant, both within the bank and to our customers, on all aspects of the textile industry.

I have a BS degree in chemical engineering from Auburn University and a MBA from the Harvard Graduate School of Business. Before joining Chase in 1965, I had approximately ten years diversified experience within the textile industry.

My testimony involves the financial implications for the textile manufacturing industry to comply with the proposed cotton dust standard, with particular emphasis on the ability to finance the capital expenditures required to comply with the proposed standard.

In 1975, textile manufacturing industry sales, including cotton products, were over $35 billion with approximately one million people employed. In the U.S., textile manufacturing is geographically located in the Southeast. Textile plants in the Carolinas, Georgia, and Alabama, account for the bulk of spinning, weaving and knitting operations.

The industry, according to government figures, is made up of more than 5,000 companies. Since most of these are small (4,300 have less than 100 employees), the industry

is highly fragmented. The largest company in the industry, with sales over $2 billion, accounts for only seven percent of sales. The second largest is only about 60% this large.

No one company is dominant either in the industry or in any major segment. While in the past it has been relatively easy for a textile company to enter a new field, it is becoming increasingly more difficult. As a matter of fact, there has been some recent consolidation by industry product line.

During the 1950's and 1960's, textile companies grew through merger. However, because of pressure from the Federal Trade Commission (FTC), during the 1970's merger and acquisition activity has been limited. In 1974, the FTC rescinded its merger guidelines and it is possible that some of the less diversified companies will use this route to strengthen their economic and market position, though to date there has been little activity in this area.

Because of the competitive nature of the textile industry, earnings and return on equity of textile companies have been traditionally lower than many other industries. After tax, earnings on sales over the last five years have averaged 2.4% compared to 4.7% for manufacturing in general and return on equity has averaged 7.2% compared to 12% for all manufacturing.

While it is possible that there may be a small improvement in textile profits, it is unlikely there will be a major change between 1977 and 1985. The competitive factors remain unchanged and there is sufficient capacity to supply anticipated demand.

Moreover, it must be remembered that in addition to being a cyclical industry, the textile industry is subject to style changes. Large, highly diversified manufacturers tend to average out this factor; for example, when spun wovens

are strong and profitable, demand for filament knits might be soft. This leaves smaller, less diversified companies in a potentially vulnerable position.

Overall, it appears that the large, more diversified manufacturers will grow at the expense of smaller companies. The trend toward concentration in market share by product line is also expected to continue.

The next few years should see an above average growth in the consumption of products made by the textile industry. On a unit basis, we estimate that domestic consumption of textile products over the next five years will grow at a rate of 4% to 4½% a year. For our domestic industry, however, this growth will be tempered by the fact that imports affect only certain areas and those to varying degrees. For example, sheets and towels are primarily domestic while certain low-priced apparel has been under continual pressure from overseas competition.

Therefore, and keeping in mind the imports problem, on a broad base, Chase is projecting an average unit growth of 3½% per year for the U.S. textile manufacturing industry for the next five years.

What I think is significant here is that by continuing to upgrade plants with the most modern and efficient equipment, the textile manufacturing industry will likely not be required due to demand to add much in the way of new bricks and mortar. There may be some individual cases of out-of-date facilities being replaced by new buildings; but for the most part, I believe we will see more in the way of modernization of existing plants, particularly in light of the vast increases in construction costs.

As for new machinery, evolutionary changes are continuing at what appears to me to be about the same rate as in the last few years. There does not appear to be any vast new

technology on the horizon. Even if there were, it would take some time to achieve acceptance. For example, open-end spinning, which was first shown in the late 1960's, is just now being accepted and has not in any way made ring-spinning obsolete.

In sum, with the moderate expected domestic textile growth and new machinery presently available, the textile industry should be able to absorb this growth within the confines of its present plan—and with less direct labor. However, to be competitive, more and more less efficient production machinery will have to be replaced by the most modern equipment currently available.

If the question of improvement in equipment was the only factor, the greater part of this could be financed by conventional methods. Depreciation, retained earnings, careful control of inventory and receivables as well as prudent use of debt should generate enough funds for a well-manned textile company to be competitive and to remain as profitable as the overall textile manufacturing industry.

However, this does not address another extremely important aspect of the textile economic situation which we are here to discuss today. To meet the proposed cotton dust standard, the Research Triangle Institute (RTI) statement suggests that $2.58 billion will have to be spent on non-production equipment by the industry over the next seven years. That would amount to about the total the industry spent on all capital projects of all types over the last 3½ years or, stated another way, almost the last 4 years of total after-tax earnings for the industry. And that is for cotton dust control alone—let alone the many other issues such as noise control with which the industry is confronted.

Now what does all this mean, and what will be the impact on the industry? First, let's look at the ways it has to raise

money. There are five major sources of capital generally available to industry:

1. Public offerings of stock or other equity instruments.
2. Public offerings of long-term debt.
3. Private placements of long-term debt with insurance companies and other institutions.
4. Intermediate bank debt.
5. Internally generated funds.

Unfortunately, in none of these areas does the textile industry stack up particularly well. Only a few public companies have access to equity markets. Many large textile companies sell at low price-earnings ratios and often well below book value.

Public issues of notes and books have much the same problem as equity, plus the fact that smaller public companies are unlikely to have access to this market.

Private placements have a greater appeal, but even here, there are limits to the amount of debt a company can manage. Many textile companies are already pushing prudent limits.

The next area, medium term debt from banks, also offers some possibilities. But there is still the question of how much additional debt would be prudent for a textile company to expect to obtain from commercial banks.

As for the last source (internally generated funds), the textile industry, as mentioned earlier, can fully exhaust depreciation and profit, less a certain amount to give stockholders a return on their investment, just to keep up technologically.

It is easy to see that the public companies that have invested the most in new machinery generally have been most profitable. Moreover, there are still too many companies that have a lot of catching up to do. As a matter of fact, we could make the point that the textile industry has been

going backward by standing still. In the 1960's, new plant and equipment expenditures peaked in 1966 at $820 million. Then, from 1967 to 1973, the range was between $530 million and $770 million. In 1973, spending reached $840 million, and is estimated at $840 million for 1976. While, of course, it is not really possible to compare 1966 machinery with 1976 machinery either in efficiency or price, there is absolutely no question that 1966 dollars would go much father than 1976. The important fact remains that the textile industry must fully utilize its resources and capital just in keeping up technologically in the production of yarn and fabric in the face of worldwide competition.

However, there is another extremely important aspect to this situation which we are addressing ourselves to today. Most of the larger companies are well diversified, often with man-made fiber products accounting for well over 50% of their sales. These products are not subject to the cotton dust standard. Moreover, the larger diversified companies have marketing expertise and flexibility to adapt to changes in manufacturing and markets. If for some reason it should not be feasible to produce products of 100% cotton because of inability to meet OSHA regulations, those companies have the financial resources to utilize existing facilities to produce replacement products. In other words, if cotton were eliminated completely, the bigger companies would stay in business.

However, there are a substantial number of companies, and no one is sure exactly how many, with sales in the range of 10 to 50 or perhaps 60 million dollars annually which are predominately cotton mills. Often, these companies produce either 100% cotton yarn or blends of cotton and polyester, which is sold throughout the industry to weavers and knitters. Some of these smaller companies also weave cotton

fabrics. These smaller companies often operate in older mills with 100% of their products manufactured from cotton in some form or another. It is these mills that will bear the largest proportionate share of the proposed 2.5 billion dollar expenditure. While at this stage it is impossible to quantify the effect on a particular company or group of companies, I am certain that many plants would not be able to comply with the standard, either from lack of economic resources or from the fact that the investment to bring an older mill up to standard would make them uncompetitive with the larger companies who have newer plants, greater resources, and better access to the latest technology.

Certainly, then, there would be some closing of plants and possible bankruptcy with resulting unemployment, often in smaller communities whose economics are dependent on the local textile plant.

Over the long run, what would happen is that many smaller companies would be faced with either liquidation or forced into merging into the larger companies that can spread out their share of this capital investment.

Really, the significance here is that the 2.58 billion dollars estimated by RTI as required to be spent over 7 years to meet the cotton standard would fall disproportionately on a group of plants utilizing cotton, which represents about 30% of total fiber consumed by the textile industry.

In summary, we are left trying to determine the ability of a segment of the textile industry to secure $2.58 billion to purchase equipment which at best will be simply non-productive.

Experience of the past indicates that the industry is already having to spend more for fixed assets than is provided by depreciation. The competitive world market, price inflation, and increasing government restrictions indicate

that this need for funds is likely to increase even further.

An increase in basic consumer demand plus the impact of price inflation should also be expected to continue, requiring that substantial amounts of cash flow be used to support growth in inventory, receivables and other assets required by increased sales volume.

Since over 90% of the companies in this industry do not realistically have access to the longer term capital markets, and given that internally generated cash flows have already proven inadequate to meet existing needs in many instances, bank debt is left as the only remaining alternative.

Therefore, in my judgment, while we have to take each case individually, it will be impossible for many companies within the industry to obtain the funds, either through bank debt or otherwise, needed to handle their share of this additional $2.58 billion burden.

[102] * * *

QUESTIONING OF GROVER WRENN

BY GEORGE PERKEL

Informal Public Hearing on Proposed standard for Exposure to Cotton Dust, April 5, 1977.

* * *

Mr. Perkel: But is it not true that when you proposed the seven year delay, it was based partly on the RTI document and partly on the letter from the RTI chief investigator to you, which is cited in the Preamble, in which he estimated [103] that it would take about seven years for the particular types of retrofitting that were developed in the RTI study to be designed and installed. So that that seven year figure is based entirely upon the retrofitting solely, is that not true?

Mr. Wrenn: It is certainly based upon the documents which you cited. They again, I think, conclude that the retrofitting strategy is the one that would most likely be followed. I think it remains to be clarified the extent to which alternative strategies are likely to be available and conceptually it would appear as in much of other human endeavor, if you provide a multitude of choices, the time required to implement them collectively conceivably could be less than all if the industries were confined to a single choice for achieving compliance with the standard.

[2488] * * *

QUESTIONING OF HOVAN HOCUTT

By Robert Hughes

Informal Public Hearing on Proposed Standard for Exposure to Cotton Dust April 28, 1977.

* * *

Mr. Hughes: Okay. So I would take it then without telling me what these things are that you are looking into innovations or better technology?

Mr. Hocutt: We have been doing that, Bob, for 30 years and we will do that for the next 30 and there is nothing unusual about that and it goes at an agonizingly, expensive, slow pace.

[2489] Mr. Hughes: I think as was mentioned earlier, with the incentive of a large standard that this would, perhaps, get—

Mr. Hocutt: It will only excelerate if I may anticipate your questions, Bob, by the way the business grows. We are never going to spend more money than we spend now percentage wise for research in the textile industry. The textile industry is not a growth industry as far as we are concerned.

All the new money that we put into R&D is going into wood dust control and grain and speciality air conditionning products and we are frantically looking for some other things and the first requirement is that they are not in the textile industry. And, you see, when we get around to producing against whatever standard you people propose, we are certainly not going to expand our plant. The last thing we will do is to make a big investment, a capital investment to increase capacity in a business that is going to go X years and then run off the cliff. So you see there is a very limited incentive for research in our type of business and we will proceed within those limits.

[2514] * * *

QUESTIONING OF HOVAN HOCUTT

By George Perkel

Informal Public Hearing on Proposed Standard for Exposure to Cotton Dust April 28, 1977.

* * *

Mr. Perkel: If the demand for the services of your company were to increase, would you not increase your capacity?

Mr. Hocutt: I am assuming you are talking about for lint and dust controls, for the textile yarn manufacturing industry. Is that correct?

Mr. Perkel: I am not limiting it to the yarn industry.

Mr. Hocutt: I cannot answer the question because there are many factors involved more than some increase in demand. Longevity is very important for capital investment. We don't make investments for short term gains.

Mr. Perkel: Well, let me put it this way then. If the Secretary of Labor were to adopt the proposed standard,

would you consider that to be a short term increase in demand that you would not expand your capacity for?

Mr. Hocutt: Yes. We would consider anything related to this cotton dust standard as a relatively short term thing. We would expand our capacity as I have already said within the limits of our plant. We would not build a [2515] bigger plant. We would not buy more machinery for a business that has a limited life. Because after the industry more or less reaches a standard, then the amount of business would be very small, of course.

Mr. Perkel: You use the term, limited life and short term. Would you define those in terms of years?

Mr. Hocutt: Well, let me say this, Mr. Perkel. The Pneumafil Corporation is not going to expand its plant for textiles whatever is decided by OSHA.

Mr. Perkel: You are not answering my question, sir.

Mr. Hocutt: Yes, I am. I am answering your question because I am saying to you, under whatever condition you say, Pneumafil Corporation will not expand its plant for the textile yarn manufacturing equipment that we sell now because it just doesn't justify any larger operation that we have already.

[2565] * * *

QUESTIONING OF JOHN P. FIGH

BY DAVID LESOURD

Informal Public Hearing on Proposed Standard for Exposure to Cotton Dust April 28, 1977.

* * *

Dr. Lesourd: There are quotas, are there not?

Insofar as we know anyway of what the future will hold, won't these quotas tend to limit the amount of imports, then?

Mr. Figh: Well, the way I understand the present agreement that is being renegotiated now, that the imports are allowed to grow at six percent and our own industry is growing say at roughly at less than that, four to four and a half percent and I think my figures may be a little on the high side.

The penetration of imports will increase as a percentage of the domestic market.

Dr. Lesourd: I think that these figures that we have been using are for textiles as a whole, are they not?

Mr. Figh: Right.

Dr. Lesourd: Does the same situation apply to [2566] cotton textiles, cotton blends?

Mr. Figh: I have not analyzed it, but I suspect that the cotton blends and the cotton fabrics both would be subject to a greater penetration from the imports than certain other products and I think one of the reasons is that a lot of imports come in in the lightweight apparel that is often made up of blends and they have a bigger share of the industry than the overall industry figure.

[2568] * * *

Dr. Lesourd: Yes sir. But I think the point I am trying to get at is that if as a result of costs that apply across the board to all textile firms tending to process cotton, if these lead to a general increase in the cost of products containing cotton, then there would be available an added flow of revenue, would there not, to the cotton textile firms? And this would tend to provide funds to finance the investment would it not? As a banker, wouldn't you consider this as part of the revenue that you would be looking for before you—

Mr. Figh: Well, I think you are looking at the saving that would be made by each individual company, I think we

would look at it case by case and how the investment would effect the cash flow of a company and I think that is really the major point. If it could be passed on I [2569] suppose so, but I would have severe reservations that it can.

And again the thing is that it goes down to certain individual companies and certain individual plants are going to bear more than their share of the burden and it is a question of whether they can be economically viable.

* * *

[2570] Dr. Lesourd: I don't think on the basis of the testimony we have heard that I know at least to what extent that is so, but regardless of—are you discounting the possibility of price increases in finished cotton textiles or the products made from cotton textiles?

Mr. Figh: I think there to a certain degree I am because again, you mentioned imports and we are talking in a context of a world market where you are competing against companies of the Far East who have no standards at all, they have no safety standards to the degree that we do. Labor I hear different figures, but say the direct labor cost is a third of what ours is, they don't have the fringe benefits that we have.

And one thing or another, so you are competing in a world market that doesn't have the same standards that we do.

Dr. Lesourd: This is true, but isn't it also true that so long as the present pattern of quotas exists probably the growth of imports will be about what is already anticipated?

Mr. Figh: Well: I really can't speculate on how the negotiations that are going on right now, they are probably in a rather delicate stage, but what the probability of them being continued, tightened or loosened, I don't know, but

if you take the assumption that they will continue to grow at [2571] six percent, people that can produce it cheaper are going to bring it in and it is going to have a decided pressure on the ability to raise prices.

* * *

Nos. 79-1429 and 79-1583

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., *Petitioners,*

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL., *Respondents.*

NATIONAL COTTON COUNCIL OF AMERICA, *Petitioner,*

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *Respondent.*

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

JOINT APPENDIX

NEIL J. KING
Counsel of Record
A. STEPHEN HUT, JR.
ANDREW N. VOLLMER
WILMER & PICKERING
1666 K Street, N.W.
Washington, D.C. 20006
(202) 872-6000

WADE H. MCCREE, JR.
Solicitor General
KENNETH S. GELLER
Deputy Solicitor General
BARRY SULLIVAN
Assistant to the Solicitor General
Department of Justice
Washington, D.C. 20530
(202) 633-2217

(Additional Counsel listed inside)

PETITIONS FOR WRIT OF CERTIORARI FILED MARCH 14, 1980 (No. 79-1429) AND APRIL 9, 1980 (No. 79-1583)
CERTIORARI GRANTED ON OCTOBER 6, 1980

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART AND EDWARDS
First National Bank Tower
Two Peachtree Street, N.W.
Atlanta, Georgia 30383

Counsel for Petitioner American Textile Manufacturers Institute, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Petitioner Milliken and Company

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S.C. 29304

Counsel for Petitioner Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Petitioner Hermitage, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
BAKER & HOSTETLER
818 Connecticut Ave., N.W.
Washington, D.C. 20006

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
Greensboro, N.C. 27405

Counsel for Petitioner Cone Mills Corporation

CARIN A. CLAUSS
Solicitor of Labor
BENJAMIN W. MINTZ
Associate Solicitor
ALLEN H. FELDMAN
DENNIS K. KADE
DIANE E. BURKLEY
JOHN A. BRYSON
Attorneys
Department of Labor
Washington, D.C. 20210

Counsel for Respondent Secretary of Labor

GEORGE H. COHEN
Counsel of Record for Union Respondents
ROBERT M. WEINBERG
JEREMIAH A. COLLINS
BREDHOFF, GOTTESMAN, COHEN, CHANIN, WEINBERG & PETRAMALO
1000 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 833-9340

Counsel for American Federation of Labor and Congress of Industrial Organizations, Industrial Union Department, AFL-CIO and Amalgamated Clothing & Textile Workers Union, AFL-CIO

LAURENCE GOLD
815 16th Street, N.W.
Washington, D.C. 20006

J. ALBERT WOLL
General Counsel, AFL-CIO
815 15th Street, N.W.
Washington, D.C. 20005

ELLIOT BREDHOFF
General Counsel
Industrial Union Department, AFL-CIO
1000 Connecticut Ave., N.W.
Washington, D.C. 20036

ARTHUR M. GOLDBERG
General Counsel
Amalgamated Clothing & Textile Workers Union
15 Union Square
New York, New York 10003

Of Counsel

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S.C. 29715

Counsel for Petitioner
Springs Mills, Inc.

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

Counsel for Petitioner
Fieldcrest Mills, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVANS & BROWNE
P. O. Box 451
Spartanburg, S.C. 29304

Counsel for Petitioner
Arkwright Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Petitioner
Blair Mills, Inc.

HARLAN H. HUNTLEY
ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541

Counsel for Petitioner
Dan River, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P. O. Box 451
Spartanburg, S.C. 29304

Counsel for Petitioner
Mayfair Mills

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
CONSTANGY, BROOKS & SMITH
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

Counsel for Petitioner
Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, Georgia 31833

Counsel for Petitioner
West Point-Pepperell, Inc.

CHARLES M. CRUMP
Counsel of Record
APPERSON, CRUMP, DUZANE & MAXWELL
2610 100 North Main Building
Memphis, Tennessee 38103
(901) 525-1711

JOSEPH A. MOSS
4143 27th Street, N.
Arlington, Virginia 22207
(703) 525-4063

Counsel for Petitioner
National Cotton Council
of America

TABLE OF CONTENTS

	Page
I. Relevant Docket Entries in the Courts of Appeals..	1
II. Exhibits Submitted in the Proceeding Before the Agency	7
1. National Institute for Occupational Safety and Health, "Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust" (Ex. 1, excerpted)	9
2. Roach & Schilling, "A Clinical and Environmental Study of Byssinosis in the Lancashire Cotton Industry" (Ex. 6-1, excerpted)	14
3. Bouhuys, "Byssinosis in the United States" (Ex. 6-16)	15
4. Braun, *et al.*, "Prevalence of Respiratory Signs and Symptoms Among U.S. Cotton Textile Workers" (Ex. 6-19, excerpted)	23
5. Bouhuys, *et al.*, "Byssinosis in Cotton Textile Workers" (Ex. 6-24, excerpted)	24
6. Bouhuys, "Breathing, Physiology, Environment and Lung Disease" (Ex. 6-27, excerpted)	25
7. Merchant, *et al.*, "An Industrial Study of the Biological Effects of Cotton Dust and Cigarette Smoke Exposure" (Ex. 6-44, excerpted)	27
8. Merchant, "Dose Response Studies in Cotton Textile Workers" (Ex. 6-51)	29
9. Molyneux & Berry, "The Correlation of Cotton Dust Exposure With the Prevalence of Respiratory Symptoms" (Ex. 6-55, excerpted)	56
10. Imbus, "Experience with Medical Surveillance Programs" (Ex. 6-57, excerpted)	58

TABLE OF CONTENTS—Continued

Page

11. Molyneux & Tomblesen, "An Epidemiological Study of Respiratory Symptoms in Lancashire Mills" (Ex. 6-66, excerpted) 61

12. Schilling, *et al.*, "Cardiovascular Disease in Cotton Workers—Part I" (Ex. 6-73, excerpted) 64

13. Research Triangle Institute, Technological Feasibility Assessment and Final Inflationary Impact Statement (Ex. 6-76, excerpted) 74

14. Statement of Dr. Arend Bouhuys (Ex. 11, excerpted) 151

15. Statement of Dr. Hans Weill (Ex. 13, excerpted) 156

16. Weill, "Report to the American Textile Manufacturers' Institute on a Study Entitled Assessment of Respiratory Responses in Textile Workers Exposed to Low Levels of Cotton Dust" (Ex. 13A, excerpted) 157

17. Statement of Bruce Held (Ex. 15, excerpted) .. 164

18. Research Triangle Institute, "Technological Feasibility and Economic Impact of Regulations for Cotton Dust" (Ex. 16, excerpted) 167

19. Merchant, Memorandum to Grover C. Wrenn: "Review of Draft Proposal for Cotton Dust Standard" (Ex. 26, excerpted) 174

20. Statement of Edward J. Baier (Ex. 38a, excerpted) 175

21. Merchant, "Epidemiological Studies of Respiratory Disease Among Cotton Textile Workers 1970-1973" (Ex. 38D, excerpted) 176

22. Morgan, *et al.*, "Report on Survey on Prevalence of Byssinosis and Respiratory Symptoms in Three Textile Mills" (Ex. 39, excerpted) 179

TABLE OF CONTENTS—Continued

		Page
23.	Supplemental Submission to Statement and Testimony of W. K. C. Morgan, M.D. (Ex. 39a, excerpted)	183
24.	Statement of W. K. C. Morgan, M.D. (Ex 40, excerpted)	185
25.	Statement of Russell A. Harley, M.D. (Ex. 41)	190
26.	Annual Cotton Dust Survey (Ex. 43)	198
27.	Supplemental Submission to Statement and Testimony of Harold R. Imbus, M.D., Sc.D. (Ex. 47b, excerpted)	200
28.	Statement of M. C. Battigelli, M.D. (Ex. 48, excerpted)	203
29.	"Burlington Industries Took Our Breath Away" (Ex. 54, excerpted)	208
30.	Statement of Carolina Brown Lung Association (Ex. 54a, excerpted)	217
31.	Statement of Moon W. Suh, Ph.D. (Ex. 55)	221
32.	Statement of Hovan Hocutt (Ex. 60)	234
33.	Statement of L. K. Fitzgerald (Ex. 69, excerpted)	252
34.	Submission of Amalgamated Clothing and Textile Workers Union: Vol. 1 (Ex. 78, excerpted)	266
35.	Statement of Parker C. Reist and Lawrence D. Kornreich (Ex. 79a, excerpted)	293
36.	Reist, *et al.*, "The Impact of New Production Equipment on Control Costs to Meet the Proposed Cotton Dust Standard" (Ex. 79c, excerpted)	296

TABLE OF CONTENTS—Continued

Page

37. Statement of William A. Burgess (Ex. 80a, excerpted) 309
38. Statement of Eric Frumin (Ex. 82, excerpted) 316
39. Statement of U.S. Department of Agriculture (Ex. 92C, excerpted) 325
40. Statement of John S. Barr, III (Ex. 101, excerpted) 327
41. Comments of the Council on Wage and Price Stability (Ex. 111, excerpted) 331
42. Statement of Dr. Sidney Wolfe & Peter Greene (Ex. 113, excerpted) 343
43. Bouhuys, *et al.*, "Epidemiology of Chronic Lung Disease in a Cotton Mill Community" (Ex. 124, excerpted) 344
44. Supplemental Submission of Amalgamated Clothing and Textile Workers Union (Ex. 143, excerpted) 348
45. Post-Hearing Comment of the American Textile Manufacturers Institute, Inc. (Ex. 160, excerpted) 372
46. Letter from F. S. Love to Eula Bingham (Ex. 171, excerpted) 388
47. Statement of Arthur Thomas (Ex. 62, Attachment II) 486

III. Transcript of Hearing Before the Agency 399
1. Excerpted testimony of Dr. Bouhuys 401
2. Excerpted testimony of Dr. Kilburn 410
3. Excerpted testimony of Dr. Weill 410
4. Excerpted testimony of Mr. Held 412
5. Excerpted testimony of Dr. LeSourd 414, 418
6. Excerpted testimony of Dr. Lee 416
7. Excerpted testimony of Dr. El Batawi 421

TABLE OF CONTENTS—Continued

Page

8. Excerpted testimony of Dr. Merchant....423, 435, 485
9. Excerpted testimony of Dr. Taylor 434
10. Excerpted testimony of Dr. Baier 442
11. Excerpted testimony of Dr. Morgan 444
12. Excerpted testimony of Dr. Harley 444
13. Excerpted testimony of Dr. Martin 445
14. Excerpted testimony of Dr. Imbus 445
15. Excerpted testimony of Dr. Neefus 449
16. Excerpted testimony of Ms. Norton 451
17. Excerpted testimony of Ms. McCoy 452
18. Excerpted testimony of Mr. Harrell 453
19. Excerpted testimony of Mr. Sandlin 453
20. Excerpted testimony of Mr. Hassell 454
21. Excerpted testimony of Mr. Baldwin 455
22. Excerpted testimony of Mrs. Sanders 456
23. Excerpted testimony of Mr. Graves 457
24. Excerpted testimony of Mr. Hocutt 458
25. Excerpted testimony of Mr. Figh 473
26. Excerpted testimony of Mr. Chapman 476
27. Excerpted testimony of Dr. Reist 477
28. Excerpted testimony of Prof. Burgess 481
29. Excepted testimony of Mr. Davis 482
30. Excerpted testimony of Mr. Mabe 483
31. Excerpted testimony of Mr. Frumin 484

IV. Order of Supreme Court granting Petitions for Writs of Certiorari in Nos. 79-1429 and 79-1583.... 487

I. Relevant Docket Entries

in

American Federation of Labor & Congress of Industrial Organizations, *et al.*,

v.

Ray Marshall, *et al.*

No. 78-1562 (D.C. Cir.)

(and Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016 and 78-2018)

Date	Filings, Orders, and Proceedings
1978	
June 19	Filing of Petition for Review of Cotton Dust Standard by American Federation of Labor & Council of Industrial Organizations, *et al.* (D.C. Cir.)
June 19	Filing of Petition for Review of Cotton Dust Standard by American Textile Manufacturers Institute, Inc. (4th Cir.)
July 27	Filing of Petition for Review of Cotton Dust Standard by Milliken and Company (4th Cir.)
August 2	Filing of Petition for Review of Cotton Dust Standard by Arkwright Mills (4th Cir.)
August 3	Filing of Petition for Review of Cotton Dust Standard by Spartan Mills (4th Cir.)
August 7	Filing of Petition for Review of Cotton Dust Standard by Blair Mills (4th Cir.)
August 7	Filing of Petition for Review of Cotton Dust Standard by Hermitage, Inc. (4th Cir.)
August 10	Filing of Petition for Review of Cotton Dust Standard by West Point-Pepperell, Inc. (5th Cir.)
August 14	Filing of Petition for Review of Cotton Dust Standard by Dan River, Inc. (4th Cir.)
August 15	Filing of Petition for Review of Cotton Dust Standard by Cone Mills Corporation (4th Cir.)
August 16	Filing of Petition for Review of Cotton Dust Standard by National Cotton Council of America (6th Cir.)

PREVIOUS PAGE WAS BLANK

Date	Filings, Orders, and Proceedings
1978	
August 16	Filing of Petition for Review of Cotton Dust Standard by Springs Mills (4th Cir.)
August 16	Filing of Petition for Review of Cotton Dust Standard by Mayfair Mills (4th Cir.)
August 17	Filing of Petition for Review of Cotton Dust Standard by Riegel Textile Corporation (4th Cir.)
August 18	Filing of Petition for Review of Cotton Dust Standard by Fieldcrest Mills, Inc. (4th Cir.)
October 3	Order transferring Cotton Dust Petitions for Review pending in the Fourth Circuit to the District of Columbia Circuit
October 6	Order transferring National Cotton Council of America Petition for Review from the Sixth Circuit to the District of Columbia Circuit
October 7	Order transferring West Point-Pepperell, Inc. Petition for Review from the Fifth Circuit to the District of Columbia Circuit
October 13	Order consolidating Cotton Dust cases in the District of Columbia Circuit
December 15	Filing of Opening Brief of Petitioners American Federation of Labor & Congress of Industrial Organizations, *et al.*
December 15	Filing of Joint Brief of the American Textile Manufacturers Institute, Inc., *et al.*
December 15	Filing of Supplemental Brief of Petitioner, National Cotton Council of America
December 15	Filing of Amicus Curiae Brief of American Farm Bureau Federation

Date	Filings, Orders, and Proceedings
1979	
January 26	Filing of Brief for the Secretary of Labor
February 7	Filing of Reply Brief of Petitioner National Cotton Council of America
February 7	Filing of Reply Brief and Brief in Intervention of Petitioners American Federation of Labor & Congress of Industrial Organizations, *et al.*
February 7	Filing of Joint Reply Brief of the American Textile Manufacturers Institute, Inc., *et al.*
February 14	Oral Argument in the United States Court of Appeals for the District of Columbia Circuit
October 24	Entry of Judgment and Opinion of the United States Court of Appeals for the District of Columbia Circuit (Reprinted in the Appendix to the Petition for Writ of Certiorari at 19)
November 7	Filing of Petition for Rehearing and Suggestion for Rehearing En Banc of Petitioner, National Cotton Council of America
November 7	Filing of Joint Petition for Rehearing and Suggestion for Rehearing En Banc of American Textile Manufacturers Institute, Inc., *et al.*
1980	
January 11	Order denying Petitions for Rehearing (Reprinted in the Appendix to the Petition for Writ for Certiorari at 103)
January 11	Order denying Suggestions for Rehearing *En Banc* (Reprinted in the Appendix to the Petition for Writ of Certiorari at 104)
January 16	Motion of National Cotton Council of America for Stay of Mandate

Date	Filings, Orders, and Proceedings
1980	
January 16	Filing of Joint Motion for Stay of Mandate by the American Textile Manufacturers Institute, Inc., *et al.*
January 17	Filing of Opposition to Motions for Stay of Mandate by the Secretary of Labor
January 17	Filing of Response of Union Petitioners to Motions for Stay of Mandate
January 22	Order directing clerk to issue mandate (Reprinted in the Appendix to the Petition for Writ of Certiorari at 106)
March 14	Filing of Petition for a Writ of Certiorari by Petitioners American Textile Manufacturers Institute, Inc., *et al.*
April 9	Filing of Petition for a Writ of Certiorari by Petitioner National Cotton Council of America
October 6	Entry of Order granting Petitions for Writs of Certiorari (Reprinted in this Joint Appendix at 489)

II. EXHIBITS SUBMITTED IN THE PROCEEDINGS BEFORE THE AGENCY

EXHIBIT 1

National Institute for Occupational Safety and Health, "Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust"

* * * * *

Feasibility of Control

Control of dust levels in cotton-processing operations can be achieved by changing or treating the raw material which is the source of the dust, by changing the process which produces the dust, or by removing the dust from the air once it is generated.

The transition from natural to synthetic fibers in the past decade has resulted in lower byssinosis-producing dust levels in those mills using synthetics or blends. Merchant et al [18] reported a median dust level of 0.485 mg/cu m for 493 samples collected in mills working with pure cotton and a median dust level of 0.163 mg/cu m for 237 samples collected from mills using blends of natural and synthetic fibers. The synthetic fibers are virtually trash free and thus contribute little to the total sample collected. [136] It would be expected that, as the synthetic content of the raw material increased, the dust levels in most work areas would decrease.

A second method of changing the raw material is through the improvement of growing techniques to reduce the trash content of the cotton. Approaches such as developing cotton varieties which shed their bracts prior to maturation and harvest or the development of dwarf determinant cottons with increased fruiting potential compared to the production of vegetative parts [137] offer future potential methods of dust control, but at present these approaches are not feasible. There is little doubt that exposure to cotton dust trash has been greatly augmented by the replacement of handpicking by machines. [138] Studies are in progress to find new chem-

PREVIOUS PAGE WAS BLANK

icals which will more efficiently defoliate cotton and reduce the trash content of the harvested seed cotton. [137]

A third method of changing the raw material is by steaming. Studies of this technique indicated that steaming could reduce the toxic effect of the cotton dust without rendering the cotton unsuitable for processing. [94] Some investigators conclude that the byssinosis-producing dusts are not removed or detoxified, but are just made to adhere more firmly to the cotton fibers; therefore the byssinosis problem is not solved but only moved from the opening, picking, and carding areas to the winding and weaving operations. [139] However, recent studies in a cotton spinning plant do not show an increase in downstream dust levels when processing steamed cotton. [140] Thus, while steaming may not be at this time a feasible alternative to dust control, it may become effective as a supplementary control method after further development. [140] Work is also in progress on improved ginning methods to allow for more efficient trash separation and/or fractionation. [137]

There appears to be little that can be done now to change the process in which cotton fibers are formed into yarn and woven into cloth in order to control dust production. The cotton manufacturing process is essentially one of fiber cleaning and alignment with the desired goal of removing all material in the cotton except the mature fibers. The dust in the cotton is thus an unwanted byproduct which must be dealt with. It is possible that the ginning process could be changed, and work is being actively pursued along these lines [137]; but at present process change does not appear to be a feasible alternative to dust control.

There are also a number of environmental factors which can be adjusted to some extent to control dust levels. As the opening and cotton cleaning machinery more efficiently removes trash and dust from the cotton

stock, the release of this material into the work areas diminishes. Thus, dust levels in the picking room, cardroom, and subsequent operations can be reduced by better cleaning of the cotton in the opening and cleaning line. [141]

Decreasing the production machine density in a work area should decrease the dust levels in that area also. Conversely, if the machines are crowded together, higher dust levels would be expected. Dust emission is also increased by higher card speeds. Improperly or poorly maintained production machinery can also lead to higher dust levels. Hocutt [141] reports that cardroom dust levels are lower when the cards are well maintained and properly operated with alert operating personnel using precise machine settings.

Large central air-conditioning systems will tend to even out dust concentrations over the entire mill. [141] Of course, this might create new problems instead of getting rid of one, since it would cause increased dust level in some area while decreasing those in others. However, air-conditioning a textile mill does provide some dust control, but the control is incidental and the increased dust load in the air-conditioning unit will result in increased maintenance costs and impede the performance of the air conditioner. Dust is removed by the washer, a unit which acts as the primary humidifier and heat exchanger in the air-conditioning system. The washer is about 25% efficient for large particles [141] and much less efficient for smaller ones. Reliance on the air conditioner for dust control means that the dust must travel through the work area to reach the air-conditioner inlet, usually located on one wall of the room. Thus, the very nature of the system makes it inefficient for dust reduction or removal.

The capture and removal of dust from the air after it has been generated from the cotton represents the most

widespread and efficient method of dust control at the present time. Table IV-3 gives summarized results from a study conducted recently by Barr et al [127] on the effectiveness of dust controls in mills having different degrees of dust control and processing varying grades of cotton. These results serve only to indicate the ranges of concentrations which may be expected for the different operations, with and without dust controls.

It appears that in some instances there may be dust concentrations (<0.5 mg/cu m) near cotton processing operations without dust control devices, but this would be the exception rather than the rule.

TABLE IV-3

RANGE OF TYPICAL LINT AND DUST CONCENTRATIONS

Operation	Total (mg/cu m)	Dust excluding lint (mg/cu m)*
Picking, no control	—	0.6-1.6
Picking, control	0.4-0.7	0.3-0.4
Opening and picking, no control	1.5-9.1	0.2-1.9
Opening and picking, control	—	0.3-0.5
Carding, no control	5.2-21.2	0.3-5.4
Carding, control	0.5-8.4	0.1-4.2

* As measured by the vertical elutriator from reference 127.

In a study of four cards, Wood and Roach [11] found dust removal to be less effective than indicated in Table IV-3; total dust levels ranged from 4.2-5.8 mg/cu m without dust extraction to 1.3-4.3 mg/cu m with dust extraction.

Efficient dust removal in cotton processing areas depends on two factors. First, there must be effective dust-capturing devices located at the points where dust could be generated. The captured dust is then transported away from the point of generation to a point where it

can either be discharged to the outside atmosphere or removed by some means from the carrier air stream. Direct discharge of the captured dust to the ouside atmosphere is not practical for two reasons. The dust is emitted in sufficient quantity to quickly produce its own air pollution problem outside, and some will probably find its way back into the work area negating the effect of the dust capture mechanisms. A second and often more compelling reason for not directly discharging into the atmosphere is the loss of conditioned air which must be replaced by new, heated or cooled makeup air. The quantities of air required for effective dust capture are large enough so that the usual practice is to recycle this air volume within the mill. [127]

Air which receives dust at one point and is cleaned at another point during complete recirculation will with time reach an equilibrium dust concentration. With ideal mixing, this concentration will equal the cleaned air dust concentration plus the ratio of the dust production rate divided by the recirculated air flow rate. [127] With good dust capture (low dust production rate) or a large recirculating air flow rate the concentration of dust in the air which is returned to the workroom will eventually determine the concentration of dust in that space. The isolation of dusty operations, successful in controlling dust exposures in other industries, has not been widely adopted in cotton mills.

* * * * *

EXHIBIT 6-1

Roach & Schilling, "A Clinical and Environmental Study of Byssinosis in the Lancashire Cotton Industry."

Our suggested grading of workrooms according to dustiness was arrived at after consideration of the prevalence in groups exposed to similar concentrations for similar lengths of time. We might have deduced permissible levels of dustiness from dose response curves in a similar way to that suggested by Roach (1953). However, we were hesitant to do this because of the possible effects of selection in those groups with the highest prevalence of byssinosis. People with byssinosis are generally aware that the dust affects their breathing and it is likely that they will leave their jobs more readily than those who are not so affected. To this extent the people working in a cotton mill are likely to be a selected population, particularly those groups who work in the dustiest jobs and are in consequence affected most by dust. To deduce permissible levels of dustiness from dose-response relationships we would have had to assume that selection operates in an exactly similar way in all mills or does not operate at all.

* * * * *

EXHIBIT 6-16

BYSSINOSIS IN THE UNITED STATES

Dr. Arend Bouhuys
J.B. Pierce Foundation Laboratory
Yale University School of Medicine
New Haven, Conn.

I would like to discuss some of the main points concerning the definition of byssinosis. At risk are cotton, flax, and hemp workers in carding and other types of dusty work. The symptoms of the disease are chest tightness, cough, and wheezing. The peculiar property of these symptoms is the timing of their occurrence. In the first few years of exposure, symptoms occur on Monday, or other days after absence from the work environment; later, symptoms occur on other days of the week; and eventually, symptoms are continuous, even in the absence of dust exposure. This description constitutes a definition of byssinosis, which many of my colleagues and I adhere to. That is, byssinosis is a disease which starts with short lasting acute responses to dust exposure and may progress to chronic lung disease with more or less severe disability. There has been disagreement on the use of the term byssinosis. Some would want to limit the diagnosis to persons who have evidence of chronic lung impairment only. This, however, would detract from the urgent need to prevent the development of chronic lung disease, and we must focus an important part of our effort on those people who respond acutely to dust but who do not yet have irreversible lung damage.

This condition has been observed all over the world. In Belgium it was studied in some 2,000 cotton workers and was described as *Monday chest tightness* in the year 1845. I might add that already in 1837 a young New York physician, McCready, wrote a book on occupational

disease, and in it he made the remark that the New England cotton mills should do something about the dust in the workrooms. However, he did not elaborate on the reasons why he thought that this dust should be removed from the air.

The disease has been studied on all continents except Latin America. So far it ranges from Dr. Gandevia in Australia (who is here today), Dr. Shogo Shima in Japan, and others in India, Taiwan, and a number of African countries, several European countries, and to the United States and Mexico. In nearly all of these studies, a smaller or larger number of people have been diagnosed as having byssinosis. Many physicians have been involved in these studies and their results have been remarkably similar. In most of these countries the disease was identified in the industry by epidemiologists. It is a recurring pattern, whenever this disease occurs, that physicians in hospitals and clinics underestimate the prevalence of this disease.

The prevalence of byssinosis in the United States, studied in three mills, has been found to be rather similar in that some 20% to 30% of the people in the carding room are affected. The percentages of people in the spinning rooms vary more. There are technical reasons for this, but I won't go into these at this time. Two main points I want to make about these findings. In the first place I want to draw your attention to a mill in the Atlanta Federal Penitentiary, where some 100 men were exposed to dust for less than one year. Percentage prevalence of Monday symptoms of byssinosis was similar in that category and in the total numbers of workers. The total number of these workers, the duration of exposure to the dust, the number of years that people had worked in this environment was much less than in the two commercial mills, where people had on the average worked for 12 to 18 years. In all these areas the total

dust concentration, in milligrams per cubic meter, is not excessively high compared to what has been found in earlier studies. This is very likely related, at least in part, to what Richard Schilling has already shown you about the effect of lint removal from the air. In all these mills there were some systems to abate dust and it is likely that these machines did a rather good job in cleaning out the visible coarse dust that does not get into your lungs, but left in the air the invisible small dust that *does* get into your lungs. I should remind you that about the best air filters for small dust particles are our own lungs; they have so many very fine tubes where the circumstances for deposition of particles, less than 5 u in diameter, are really very excellent and these are much better filters than any of the mechanical devices that are currently used in most textile mills.

How can we detect this disease apart from asking the workers for their symptoms? One of the best ways of doing this is by having the worker blow hard into a spirometer, a measuring device for lung volume changes, before he starts work on a Monday and again before he goes home at the end of the shift. At the end of the Monday the value measured by this device [the forced expiratory volume in 1 second (FEV 1)] is lower than in the morning. The results of a group of cotton workers in Sweden provide data similar to that obtained in many cotton mills including those in this country. At the end of the day on Monday these people, on the average, have significantly lower values of their capacity to breathe out forcefully, and this decrease is larger in those who complain of Monday symptoms than in those who do not have such a history. This change means that somewhere along the airways there is some narrowing of the fine tubes that conduct the air to our lungs. The people who do not complain have a similar response as those who do. In other occupations, including coal mining and other dusty jobs, such a response does not occur. The

people in coal mining and other dusty jobs do not decrease their FEV 1 during exposure and likewise people in other occupations do not show such a response.

The decrease of FEV 1 in textile workers is caused by the dust they inhale. Those with the more severe drop of FEV 1 will complain of chest tightness; those with less severe responses may not complain.

Another way of looking at the same phenomenon is provided by the flow-volume curve. These are curves which I will interpret very simply by saying that the horizontal axis shows how much you can breathe out. The length of the horizontal portion of the curve is proportional to the volume one breathes out. The distance along the ordinate is proportional to how fast you can breathe it out. In other words, you have a sort of performance diagram of the lungs during expiration. Without going into the physiology of it, I would just like to state that the rapidity of expiration in a considerable proportion of this curve is quite unrelated to how hard you try. You have to deliver a minimum of effort but beyond that you will not improve the flow rates. These flow rates decrease markedly by the end of the work shift. An example is given, based on results in six representative workers. These flow rate decreases are caused by the narrowing of small airways in the lungs.

Let me describe two older textile workers. These men have been exposed to hemp dust for about 25 years or more and it illustrates what can happen. Two things can happen to someone who stays in this dust long enough. On the one hand, we have a man of 53 years who has a normal pulmonary function. His vital capacity is normal for his age and height. His flow rates are also normal for his age and height. This person has never experienced Monday symptoms of byssinosis while he worked in the dust. Unfortunately, such people

are in the minority. The other man is 59 years of age. His pulmonary function is severely decreased. His vital capacity is far too small, but much more important, his capacity to breathe out rapidly is severely disturbed. As a result this person is severely disabled. This man has experienced Monday symptoms of byssinosis all through his working life. Unfortunately, such people form a much larger proportion of an older population of these workers than do the non-reactors of which the first man is an example. There are many disabled cotton workers in the southern part of the United States. In 1966 Dr. Schilling and I spent altogether one week in the South and, with the aid of two physicians, we saw 14 cotton workers. Half of these were severely disabled by respiratory deficiency. I'm convinced that a more thorough and more systematic study would show this type of disability is prevalent wherever appreciable numbers of people have been exposed to cotton dust for many years. We have not yet been able to do such a thorough epidemiological study in the United States, but we have done this in Spain in a town where a large proportion of the population used to work in hemp dust.

Hemp workers and controls do not differ in the younger age category. The difference is highly significant in the older category where the hemp workers have a severely decreased FEV 1, which is quite significantly smaller than that in the control subjects who were living in the same area but who were not exposed to the dust. I might say that these control subjects are quite comparable in this respect to the data which has been obtained by several people in other populations, like Dr. Ferris in British Columbia. This type of data is pretty much the same wherever you do it unless there is some special factor at work, like in this case the hemp dust.

It has been asked, of course, what is the agent in the dust that causes this acute response which may lead in

a certain portion of cases to severe chronic lung disease. The bracts are the crumbling leaves around the stem that are dead long before the plant is harvested. When we make a very simple watery extract of these bracts, we can demonstrate certain effects on human lung tissue. In the laboratory we can also have this extract inhaled by healthy people. Two healthy investigators inhaled this extract of bracts for ten minutes. In this case we had boiled the bracts to determine whether or not the agent was heat stable. Both the subjects experienced chest tightness after this exposure. Both of them have a decrease of maximum flow rates—very similar to what one finds in the cotton and hemp workers exposed to the industrial dust. We believe that there is a pharmacological agent which is in the dust because the dust contains bract particles, broken up. A substance that is rather easily water-soluble, so that when dust hits your airways, this substance can transfer to the tissue and exert its toxic action. Whether this agent is the sole cause of the long term changes remains to be seen. It is also quite possible that apart from the one action of this agent, which we have identified, there are others which contribute to an action. So far, however, we have been unable to get similar data with any other part of the cotton plant we've tried, so for practical purposes I think that these leaves are very important. If they were not in the cotton dust we would very likely have much less of a problem. Control of this disease is obviously necessary and I'm sure that this is going to be mentioned by several speakers in this program and I don't want to preempt what they are going to say. I would like to emphasize, I think there are many good measures that can be taken on relatively short term at least to prevent poeple who are now at work in the industry from becoming disabled and those who may have some degree of irreversible decrease of pulmonary function from getting worse. I think this can be achieved by education, by pre-employ-

ment medical examination, and by periodical medical examinations. There are a number of common sense measures that can be taken to protect people who are in the industry. I'm sure that some people who are affected might be transferred to other jobs. This is not practical for all of them, obviously, and it is not practical for all of those who respond to dust. Also, there are drugs that can prevent the acute action of this dust, which might be used in suitable cases. On the long term, there is no substitute for suppression of the fine dust in the air. This is a very urgent matter, as Richard Schilling has also pointed out. Technology will have to be developed for getting rid of the fine dust which, so far as I am aware, has not been done in the textile industry on any large scale.

I think that a large amount of work has to be done, not only in this particular industrial lung disease, but in general in industrial lung diseases. My personal feeling and that of several of my colleagues is that as a cause of environmentally induced lung disease, industrial emissions are far more important than general air pollution as a cause of disability and death. They can be completely prevented and we don't have to wait for much further research in order to prevent the diseases. There is a lot that remains to be learned about these diseases, but there is also a serious lack of application of the knowledge that we have and we don't have to wait until all the answers are in before we can prevent people from becoming disabled by industrial lung disease.

The data on which this presentation is based has been published in the following papers:

Bouhuys, A., L. J. Heaphy, Jr., R. S. F. Schilling, and J. W. Wellborn. 1967. Byssinosis in the United States. New Eng. J. Med. *277*:170-175.

Bouhuys, A., R. L. Wolfson, D. W. Horner, J. D. Brain, and E. Zuskin. 1969. Byssinosis in cotton textile workers. Respiratory survey of a mill with rapid labor turnover. Annals Int. Med. *71*:257-269.

Zuskin, E., R. L. Wolfson, G. Harpel, J. W. Wellborn, and A. Bouhuys. 1969. Byssinosis in carding and spinning workers: Prevalence in the cotton textile industry. Arch. Environ. Health, *19*:666-673

The prevention and control of byssinosis and of industrial lung diseases have been discussed in:

Bouhuys, A. and J. M. Peters. 1970. Control of environmental lung disease. New Eng. J. Med. *283*: 573-582

Bouhuys, A., J. C. Gilson, and R. S. F. Schilling. 1970. Byssinosis in the textile industry; research, prevention and control. Arch. Environ. Health *21*: 475-478.

EXHIBIT 6-19

Braun, *et al.*, "Prevalence of Respiratory Signs and Symptoms Among U.S. Cotton Textile Workers"

* * * * *

The workers who complain of tightness do not necessarily have a loss in $FEV_{1.0}$, or vice versa, as stated in the literature.

* * * * *

EXHIBIT 6-24

Bouhuys, *et al.*, "Byssinosis in Cotton Textile Workers"

* * * * *

No general agreement has as yet been reached on these questions. Our tentative answer to the first question is affirmative: If lung function tests show that airway obstruction develops in a worker during textile dust exposure, we view this as objective evidence that the dust affects his airways. For several reasons such persons may not always mention subjective symptoms of respiratory distress during a questionnaire interview. When interviewed on Monday after work, symptoms may be mentioned by men who denied them during a previous interview conducted at a time that they did not experience the dust effect (22). Secondly, some textile workers markedly dissimulate symptoms (23), possibly because of fear of losing their job. Thirdly, as in other diseases, the threshold of awareness of distress may vary individually. We believe that byssinosis should be diagnosed in all workers in whom evidence of an effect of textile dust on the lungs is obtained.

* * * * *

EXHIBIT 6-27

Bouhuys, "Breathing, Physiology, Environment and Lung Disease"

* * * * *

As a working hypothesis, one may assume that the repeated microinsults to the lungs that occur each time a worker is exposed to toxic dust, especially on Monday, have a cumulative damaging effect. The damage mechanism is not known. If the histamine release from mast cells during acute exposure involves damage to cell walls, this process might represent such a microinsult. Chronic lung damage might result from these and possibly other microinsults on the cellular elements, if regularly repeated during many years.

* * * * *

The practical significance of the functional grades (see Table 17-3) is as follows:

F 0: no demonstrable acute effect of the dust on ventilatory capacity; no evidence of chronic ventilatory impairment.

F ½: slight acute effect of dust on ventilatory capacity; no evidence of chronic ventilatory impairment.

F 1: definite acute effect of dust on ventilatory capacity; no evidence of chronic ventilatory impairment.

F 2: evidence of slight to moderate irreversible impairment of ventilatory capacity.

F 3: evidence of moderate to severe irreversible impairment of ventilatory capacity.

Increasing grades indicate increasing severity of functional impairment. F ½ and F 1 indicate acute dust

effects. Workers in grade F 1 should, if at all possible, be removed to jobs in nonrisk areas.

* * * * *

Table 17-3

Recommended Functional Grades in Byssinosis

Grade *	$\triangle$ $FEV_{1.0}$† (liters)	$FEV_{1.0}$ ‡ (% of predicted)
F0	−0.05-0; or +	>80
F½	−0.06- −0.20	>80
F1	>- −0.20	>80
F2	—	60-79
F3	—	<60

* If the grades based on $\triangle$ $FEV_{1.0}$ and $FEV_{1.0}$ differ, assign the highest of the two grades.

† Difference between $FEV_{1.0}$ before and after work shift on a first working day of the week.

‡ $FEV_{1.0}$ in the absence of dust exposure (2 days or longer); use value postisoproterenol whenever this drug can be used.

EXHIBIT 6-44

Merchant, *et al.*, "An Industrial Study of the Biological Effects of Cotton Dust and Cigarette Smoke Exposure"

Until recently, little awareness had been expressed in the U.S. medical literature about respiratory disease acquired from working in the cotton textile industry.

* * * * *

It is the purpose of this paper to describe and quantitate individual and combined effects of cotton dust and cigarette exposure as associated with byssinosis prevalence and four parameters of ventilatory capacity. Because of the constraint of time, only white males employed in preparation and yarn processing areas will be considered for statistical analyses.

Methods

Selection of the Population: Initially, a total of 22 North Carolina textile manufacturing plants were visited to determine the grade and count of yarn manufactured, plant layout, ventilation systems, machine exhaust systems and distribution of workers by sex, race, age and work area. Twelve plants processed primarily cotton, five cotton-synthetic blends and five either synthetic or wool material. Based on information gained through these visits and from a previous survey [4] which provided estimates on the distribution of smoking habits, three strata of exposure (cotton = high risk, cotton-synthetic blend = moderate risk, synthetic-wool = low risk) were selected for a three factor factorial design to fill adequately four categories of age (15-29, 30-39, 40-49, 50-70), sex and three categories of smoking habit (never smoked, current smoker, former smoker). Initially two plants at extremes of exposure were picked for the first two surveys. From these surveys better estimates of demographic characteristics and disease prevalence were sought to help select other plants to fill categories of the factorial de-

sign. Other selection criteria were age of the plant, whether it was associated with a mill village and proximity to other mills under consideration. At least thirty miles were allowed between plants.

Three cotton mills, all processing strict low middling cottons, were selected. Mill A processed cotton with a mean count of 6. Mill B with a mean count of 31, and Mill C with a mean count of 33 plus 25% synthetic material. Two cotton-synthetic blend mills processing primarily strict middling cottons were selected. Mill D processed 50% synthetic material and 50% middling cotton with a mean count of 29, and Mill E processed 49% synthetic and both strict low middling and middling cottons with a mean count of 32. The grade, count and mix of materials had been relatively constant in the few years preceding the study in all five cotton mills. Two synthetic processing mills, Mill G and Mill H, processed only synthetic material and one mill, Mill F, processed 100% wool. All had previously been cotton mills but none had processed cotton for more than 20 years. All mills selected had once been associated with a mill village.

Within each mill up to four primary work areas were defined. The preparation area included opening, blending, picking, carding, drawing, combing and roving. The yarn processing area included spinning, winding, twisting, spooling and warping. Slashing and weaving operations were combined to form a third primary work area. Other employees studied were those employed in the warehouse, shops, labs, supply areas, inspecting area, the yard and administrative personnel. None of these employees could be assigned a dust level since their dust exposure was intermittent and variable.

EXHIBIT 6-51

Merchant, *et al.*, "Dose Response Studies in Cotton Textile Workers"

There is evidence of awareness of the fundamental association between increased dust level and increased prevalence of respiratory disease among textile workers since early in this century when efforts were made to minimize disease through suppression of dust from the carding engine.[1] Although this concept of dose-response was appreciated, it was not quantitated until 1960 when Roach and Schilling [2] reported their study of the association between three fractions of cotton dust and its characteristic biological response. They found the strongest linear association between the protein content of the middle fraction of dust (7μ to 2mm-Hexlet) but also a strong linear correlation with total lint and dust. Because of this strong association with gross dust concentration and the simplicity and rapidity of sampling for total dust, they recommended 1 mg/m^3 gross dust as a reasonably safe level of occupational exposure. This recommendation was adopted by the American Congress of Government Industrial Hygienists and is the current threshold limit value for cotton dust.[3]

Roach and Schilling recognized that some fine dust ($< 7\mu$) and medium dust (7u-2mm) was trapped on the lint mat collected on the 2 mm screen, which may have reduced the correlation coefficients for these fractions.[2 4] Subsequent observations showed that the fine fraction of dust ($< 7\mu$) could account for nearly all of the prevalance of byssinosis,[5 6 7] and that gross dust levels, particularly in yarn processing areas (spinning, winding, twisting) could be misleading indicators of biological effect.[8 9 10] In recognition of these findings, new standards for safe levels of cotton dust exposure are being considered in Great Britain and the United States.

The study described in this paper offered the opportunity to observe biological effects in a large working popula-

tion over a wide range of dust exposure. The primary objectives of this portion of the study were to evaluate the vertical elutriator cotton dust sampler and to develop dose-response relationships to help establish the safe level of exposure to lint-free cotton dust.

Methods

Definitions, the study design, and methods used in collecting data are found in the Methods section of the preceding paper.[11] As previously described, each worker was assigned a mean, median and a geometric mean dust level of his work area which was used to develop dose-response curves. Although little difference was apparent in these three measures of central tendency (Table 1), the median

Table 1.—Vertical Elutriator Dust Samples by Mill Type, Work Area, Measures of Central Tendency and Range North Carolina, 1970-71

Mill Type	Work Area			
	Preparation	Yarn	Slash/Weave	Total
Cotton				
Dust Samples, n	260	131	102	493
Workers, n	215	494	367	1076
Mean	.899	.303	.985	.654
Median	.669	.257	.798	.485
Geometric Mean	.639	.201	.828	.411
Range	.090-3.56	.013-1.30	.227-2.74	.013-3.56
Blend				
Dust Samples, n	130	61	46	237
Workers, n	164	398	146	708
Mean	.264	.122	.682	.270
Median	.163	.088	.683	.163
Geometric Mean	.194	.097	.666	.169
Range	.006-1.37	.006-.715	.292-.959	.006-1.37
Synthetic-Wool				
Dust Samples, n	134	121	—	255
Workers, n	212	586	—	798
Mean	.269	.157	—	.191
Median	.238	.186	—	.186
Geometric Mean	.232	.114	—	.138
Range	.017-.733	.013-.847	—	.013-.847

dust level was chosen because it reduced the effect of outliers and provided the best distribution of the population.

Mathematical dose-response curves were fitted to data on byssinosis prevalence by median dust level. Six groups of workers (Table 2), including black and white men and

Table 2.—Six Worker Groups by Smoking Status

Group	Smoking Status	Byssinosis Grades	Exposure
1.	Current Smokers	Grade ½, 1, 2	Cotton/blend mill preparation and yarn areas
2.	Never Smoked	Grade ½, 1, 2	Cotton/blend mill preparation and yarn areas
3.	All Workers	Grade ½, 1, 2	Cotton/blend mill preparation and yarn areas
4.	All Workers	Grade ½, 1, 2	Cotton/blend mill slashing and weaving areas
5.	All Workers	Grade 2	Cotton/blend mill preparation and yarn areas
6.	All Workers	Grade 1 and 2	Cotton/blend mill preparation and yarn areas

women, in two primary exposure areas (primarily cotton dust and cotton dust plus sizing) by smoking status are considered:

Raw data was categorized by arbitrary dust level groups to provide a wide and balanced (as well as possible) distribution of workers by dust level (Tables 3, 4). Because the number of workers above 1 mg/m^3 represented less than five percent of the total population and was therefore likely to result in unstable rates, and because those exposed to these high dust levels were likely to be a select, relatively more resistant group of workers, they were eliminated from consideration for calculation of linear regressions (except for Group 4). The truncated regression plots and correlation coefficients are displayed for this data in Figs 2, 3 and 4.

Table 3.—Demographic and Smoking Characteristics of Preparation and Yarn Processing Workers in Cotton and Blend Mills by Median Dust Level

Dust Level	0 to .056	.057 to .0838	.0839 to .1254	.1255 to .1877	.1878 to .2808	.2809 to .4201	.4202 to .6286	.6287 to .9404	.9405 to 1.407	1.408 to 2.105
Men										
n	70	34	104	144	61	122	69	65	30	42
Mean Age	39.5	36.9	38.7	42.1	33.6	37.8	38.8	37.1	41.4	38.7
% Current Smokers	67.1	64.7	56.7	54.9	73.8	53.3	73.9	55.4	73.3	66.7
% Former Smokers	14.3	23.5	19.2	22.2	9.8	18.0	10.1	16.9	13.3	14.3
% Black	5.8	8.8	7.7	19.0	26.2	29.2	27.5	36.9	13.3	64.3
Women										
n	75	37	89	135	17	85	77	0	1	0
Mean Age	41.5	43.9	44.4	42.9	39.6	38.8	37.7		21.0	
% Current Smokers	44.0	32.4	25.8	36.3	47.1	36.5	32.5	0	0	0
% Former Smokers	12.0	0	4.5	6.7	5.9	12.9	10.4	0	0	0
% Black	19.2	10.8	5.6	17.9	52.9	16.9	27.3	0	100.0	0

Percent change in $FEV_{1'0}$ with six hours of dust exposure for cotton/blend mill preparation and yarn area workers and synthetic/wool mill workers by dust level is shown in Table 5. Linear regressions truncated at 1 mg/m^3 were calculated and the regression lines and correlation coefficients shown in Figure 6.

Kenneth A. Busch, National Institute for Occupational Safety and Health, analyzed prevalence data using a probit model,[12 13] and developed Table 6 through 9 and the probit curves in Figs 2 through 4. His protocol for analysis was as follows: For each set of data, the method of maximum likelihood was used to fit a straight line to Y= probit (prevalence ratio) vs. X= $\log_{10}$ (median dust level in mg/m^3). A chi-square goodness-of-fit test was made to test jointly for both nonlinearity and excessive variance about the fitted curve as compared to theoretical results expected under the probit model. Ninety-five percent statistical confidence limits were put upon the true

dose-response curve as well as upon predicted dust levels corresponding to eight arbitrary levels of hypothetical byssinosis prevalence: p= 1%, 2%, 3%, 4%, 5%, 10%, 25,% and 50%. Pairs of curves for Groups 1 and 2, and for Groups 3 and 4, respectively, were tested for parallelism and, if found to be parallel, a "relative toxicity" metameter R was estimated along with its 95% confidence limits. By "relative toxicity" is meant the ratio between dust levels which produce the same prevalence of byssinosis in the two groups. Thus an R-value of 1.0 would imply the two curves were coincident. When curves for two groups are found to be non parallel, the difference between them is difficult to interpret since relative toxicity would not be constant at all levels of response. In such a case, a conditional relative dose metameter Rp was calculated for several p-levels of prevalence of byssinosis in the two groups.

Results

Table 2 summarizes 985 vertical elutriator (Fig 1) dust samples by mill type, work area, measures of central tendency and range. The greatest number of samples was collected in the preparation areas of the cotton and blend mills. The highest dust levels are recorded in the slashing and weaving areas of cotton and blend mills where sizing is used and contributes to the dust concentration. Where sizing is not used, the dust levels in the preparation area were consistently much higher than in the yarn processing areas. The mean dust levels were generally higher than the median or geometric mean levels, reflecting the effect of high out-liers. In synthetic and wool mills there was little difference in dust level between preparation and yarn processing areas. The highest dust levels in these mills were found in the preparation area of the wool mill and the preparation area of a synthetic mill where gasoline driven machinery was used.

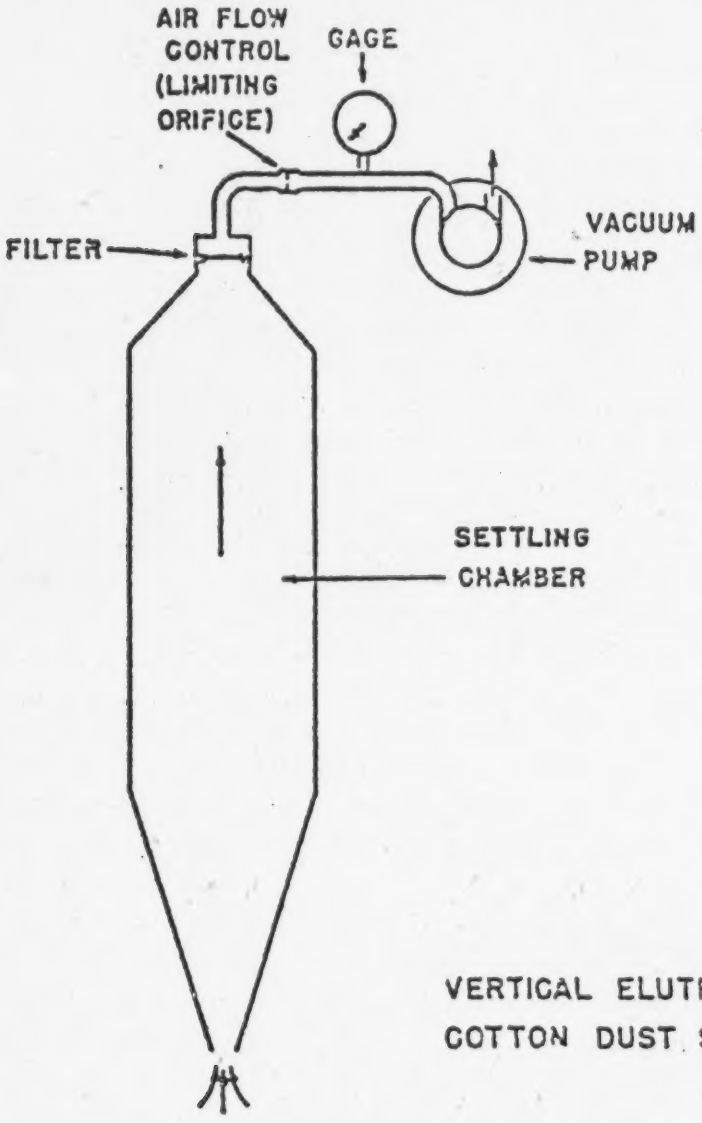
Demographic and smoking characteristics for men and women in cotton preparation and yarn areas by dust level are shown in Table 3. No clear age trend is apparent among men or women, nor is there a consistent difference in the proportion of current or ex-smokers between dust subgroups. Among men, a greater precentage of blacks were found with increasing concentration of dust exposure. This was less apparent among women who rarely work in the dustiest areas of the mills.

Busch concluded from his analysis that the log-probit model fitted the data well in every case. The points were scattered randomly about the fitted dose-response curve and the variance of deviations from the curve was not significantly greater than would be expected based upon an assumption of binomially-distributed prevalence ratios at each dust level.

Slopes (b) and intercepts (a) of the fitted log-probit dose-response curves, $Y = a + bx$, are shown in Table 6 together with three calculated points (ordinates Y) for each fitted curve and their 95% confidence limits. The curve equation was then inverted to predict dust levels corresponding to arbitrary prevalence levels. Table 7 shows the predicted dust levels and their 95% confidence limits for the six groups of workers for prevalence levels of 1%, 2%, 3%, 4%, 5%, 10%, 25% and 50%.

Chi-square tests for goodness-of-fit of the individual curves and for parallelism of pairs of curves (1 vs. 2 and 3 vs. 4) are shown in Table 8. Curves for current smokers (Group 1) and those who never smoked (Group 2) were found to be significantly different although nearly parallel but not coincident. A relative toxicity of $R = .56$ with 95% confidence limits of $R = .35$ to $R = .83$ was found (Table 8); this suggests that only 56% (35% to 83%) as much cotton dust is associated with any given prevalence of byssinosis among smokers as among

those who never smoked. Curves for all prepartion and yarn workers (Group 3) and for all slashing and weav-



VERTICAL ELUTRIATOR
COTTON DUST SAMPLER

- Fig 1.

ing workers (Group 4) were not found to be parallel. Therefore a single R-value was meaningless and it was necessary to calculate R_p-value as a function of eight arbitrary prevalence levels which are shown in Table 8. Curves for Groups 3 and 4 were found to be significantly different but yielding R_p-values which ranged from .087 at a byssinosis prevalence of 1% to .56 at a prevalence of 50%. Therefore, only approximately 9% (4% to 15%) as much cotton dust is associated with a 1% byssinosis prevalence for workers in the preparation and yarn areas of cotton mills as compared to the amount required for the same prevalence for cotton slashing and weaving workers. At a prevalence of 5% an average of 15% as much dust is required, as a prevalence of 25%, 32% as much, and at the 50% prevalence level 56% as much dust is required.

The probit-dose response curves are shown in Figs 2, 3, 4, together with the linear regression plots and correlation coefficients. The truncated linear plots are observed to fall within the 95% confidence limits of the probit curves below a dust level of 0.5 mg/m³. Both dose response curves for cotton slashing and weaving workers fell nearly on the same line through 2.0 mg/m³ of dust. The strength of the linear association between dust level and byssinosis prevalence was uniformly high except for those who had never smoked (Group 2) where the correlation coefficient was .52; however, one subgroup within this population contained only seven workers, none of whom had symptoms of byssinosis. Expected byssinosis prevalence levels are shown in Table 6 and the curves plotted for Groups 3, 5 and 6 in Figure 4. Prevalence of Grade 2 byssinosis (Group 5) ranges from 1.3% (0.7-2.3) at 0.1 mg/m³ to 3.0% (2.1-4.3) at 0.2 mg/m³ to 8.0 (6.1-10.2) at 0.5 mg/m³, as computed from the probit curve. When Grade 1 and 2 byssinotics are combined (Group 6) the probit prevalence levels are 2.1% (1.3-3.3) at 0.1 mg/m³, 5.0% (3.9-6.6) at 0.2 mg/m³ and 13% (10.7-15.8) at 0.5 mg/m³.

Table 5 and Fig 5 show percent change in $FEV_{1.0}$ with increasing levels of exposure among cotton preparation and yarn area workers and synthetic and wool workers. The truncated linear regression (Fig 5) for the cotton population again showed a strong linear association ($r = .82$) between biological effect and dust level. No decrement in percent changes in $FEV_{1.0}$ is seen with increasing levels of exposure to synthetic and wool dust.

Discussion

Dust Sampling.—In the year preceding this study, several cotton dust sampling techniques were evaluated.[14] The sampling device desired was to be relatively easy to operate, portable, durable, operable unattended for a full shift and provide a lint free dust sample. Of the sampling devices evaluated, the vertical elutriator developed by Lynch and Lumsden [14] was found to best fulfill these criteria. The instrument was designed to sample dust with a mass median aerodynamic diameter of 15μ and less which effectively eliminated biologically inert lint while retaining particles of the size expected to be inhaled. Since high correlations between byssinosis symptoms and dust level have been observed with the middle fraction (7μ to 2mm) of dust, [2 15] it was thought that larger particles (7μ-15μ) as well as "respirable" particles ($<7\mu$) should be collected. An added practical advantage of including larger particles is the accumulation of a weighable sample in a shorter interval. A potential disadvantage was the possibility of including fine but inert "linters" in the sample. This has been observed rarely in our experience and appears to occur only under the dustiest of conditions when exact dust levels are not as important.

In the absence of a specific assay for the etiological agent(s) responsible for the biological effects of cotton dust, the most important consideration in evaluating a

Table 4.—New Data on Byssinosis Prevalence vs. Median Dust Levels for Six Groups of Workers

Mid-Point * of Range of Median Dust Levels (mg/m^3)	Sample Size n	Cases of Byssinosis r	Prevalence (%) p = r/n x 100
Group 1. Cotton Preparation and Yarn Areas All Grades—Current Smokers			
.05	167	10	6.0
.15	159	21	13.2
.25	82	14	17.1
.35	64	14	21.9
.45	55	15	27.3
.55	26	11	42.3
.75	31	16	51.6
1.1	12	5	41.7
1.5	12	7	58.3
1.9	26	12	46.2
Group 2. Cotton Preparation and Yarn Areas All Grades—NonSmokers			
.15	127	3	2.4
.15	145	9	6.2
.25	44	2	4.5
.35	54	16	29.6
.45	49	12	24.5
.55	7	0	0
.75	18	5	27.8
1.1	2	0	0
1.5	3	2	66.7
1.9	8	3	37.5
Group 3. Cotton Preparation and Yarn Areas All Grades—All Workers			
.0458	145	5	3.4
.0686	71	2	2.8
.1026	193	14	7.3
.1535	279	27	9.7
.2296	78	10	12.8
.3435	208	39	18.8
.5139	147	37	25.2
.7689	65	30	46.2
1.150	31	14	45.2
1.722	42	17	40.5

* Arithmetic mean of end-points used for groups 1, 2, 4.

Geometric mean of end points used for groups 3, 5, 6.

Table 4.—Continued

Mid-Point * of Range of Median Dust Levels (mg/m^3)	Sample Size n	Cases of Byssinosis r	Prevalence (%) p = r/n x 100
Group 4. Cotton Slashing and Weaving Workers All Grades—All Workers			
.35	15	1	6.7
.45	136	7	5.1
.55	2	0	0
.75	195	14	7.2
1.1	34	6	17.6
1.5	87	23	26.4
1.9	44	16	36.4
Group 5. Cotton Preparation and Yarn Areas Grade 2			
.0458	145	0	0
.0686	71	1	1.4
.1026	193	2	1.0
.1535	279	9	3.2
.2296	78	1	1.3
.3435	208	8	3.8
.5139	147	14	9.5
.7689	65	11	16.9
1.150	31	6	19.4
1.722	42	6	14.3
Group 6. Cotton Preparation and Yarn Areas Grades 1 & 2			
.0458	145	0	0
.0586	71	2	2.8
.1026	193	2	1.0
.1535	279	11	3.9
.2296	78	2	2.6
.3435	208	23	11.1
.5139	147	22	15.0
.7689	65	15	23.1
1.150	31	8	25.8
1.722	42	9	21.4

* Arithmetic mean of end-points used for groups 1, 2, 4.
Geometric mean of end points used for groups 3, 5, 6.

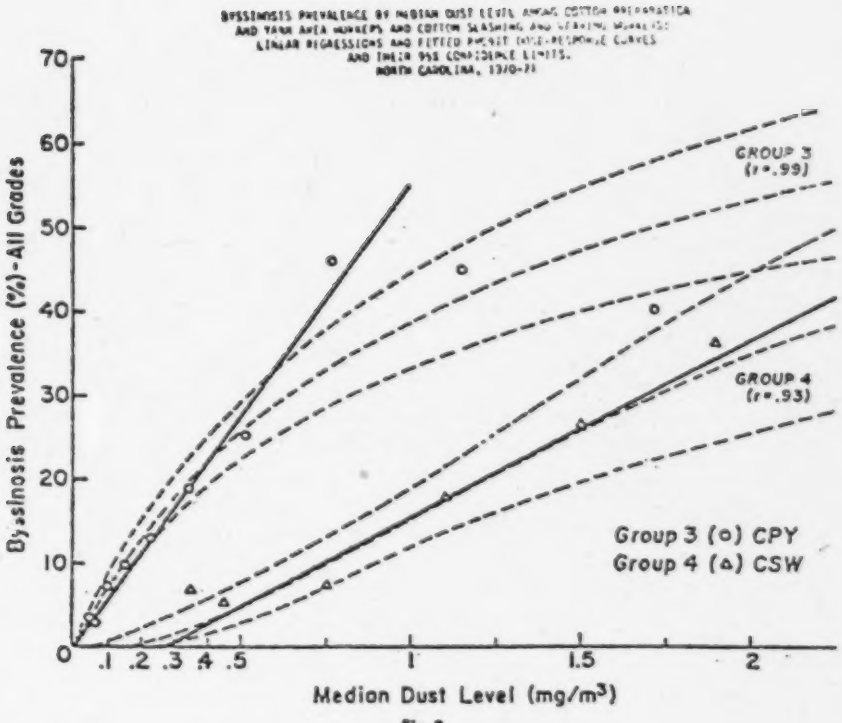


Fig-2.

gravimetric sampling technique is the degree of correlation with biological indicators over the range of exposure. As shown in Figs 2 through 5, a strong linear association was found in this population, particularly below 0.5 mg/m³, the level below which the majority of the population is exposed and where attention is focused concerning establishment of a reasonably safe exposure level.

As a field instrument the vertical elutriator cotton dust samplers have proven to be most practical and durable. The 25 samplers built for this survey have now been in use for two years and have collected over 3000 samples. No modification of the instrument or the sampling procedure has been necessary. Its design lends itself to use within the manufacturing plant; at no time has it

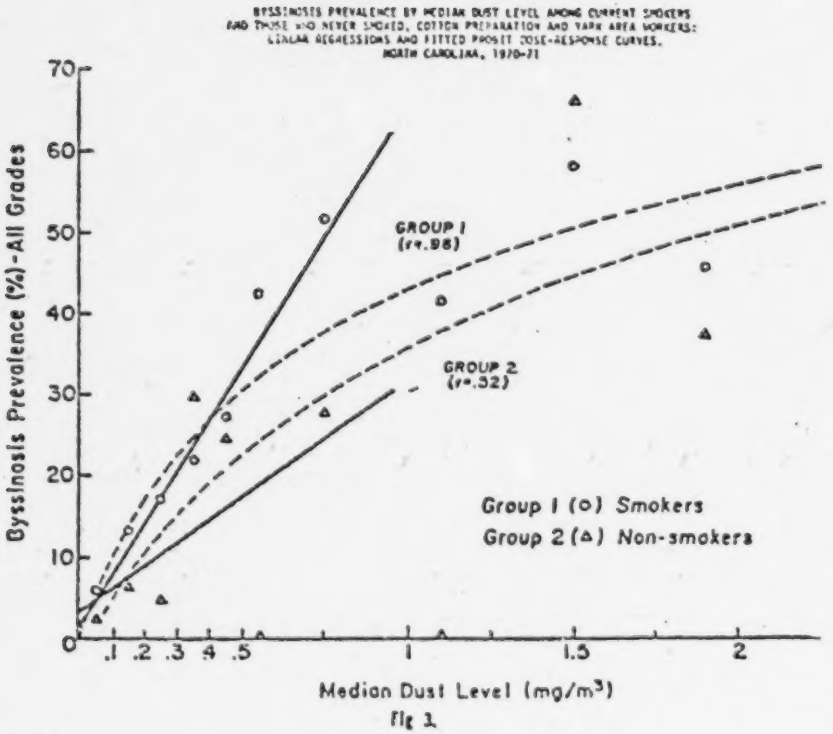


Fig 1.

interfered with the manufacturing process or personnel. Sampling with this instrument can easily be learned and could be used by manufacturing personnel to monitor their working environment.

Dose-Response.—In developing dose-response curves for byssinosis, tables were developed by sex, smoking groups, work areas (preparation, yarn production and slashing/weaving) and mill type (cotton and blend). A strong linear association was repeatedly observed in these subpopulations. Since there appeared to be no difference in age between individual dust level subgroups (Table 3), there was no reason to age adjust the data. Similarly, no difference in byssinosis prevalence has been found in men and women, allowing both to be considered together.

Preparation and yarn processing areas are justifiably combined since the dust is of the same composition, the dose-response curves for each area are similar, and the areas are frequently continguous. When the yarn arrives in the slashing department, sizing is added to the yarn and has been found consistently to increase the concentration of lint free dust in the slashing and weaving areas. Therefore, the biologically active airborne material in these workrooms is diluted with biologically inert sizing, making it necessary to consider this dust separately when considering these significantly different dose-response relationships. Cigarette smoking has been found to significantly increase byssinosis prevalence [9 11 16 17] and must therefore be considered a potential source for a secondary association. Table 3, however, shows no apparent difference in smoking habits between dust level sub-populations. Probit analysis revealed that byssinosis prevalence for smokers was significantly higher than for non-smokers. Although it may be argued that the most susceptible group (smokers) should be most closely considered when recommending safe levels of exposure, the majority of this working population smoke cigarettes and the dose-response curves for current smokers and all workers regardless of smoking habit are similar. For this reason, and because a standard generally applies to the entire population at risk, consideration of the entire population regardless of smoking habit appears to be most appropriate.

As initially observed by Roach and Schilling,[2] and later confirmed by El-Batawi,[18] Molyneaux,[15] and our group in an independent study,[19] dose-response curves for the association between dust level and byssinosis prevalence and/or change in FEV_{10} are strikingly linear. This was found repeatedly in this data no matter how the groups were divided, unless the number of workers in the dust level sub-populations was so low as to produce unstable rates

(Group 2, r = .52, Fig 3). With this exception, correlation coefficients were consistently above 0.9. Similarly, the association between percent change in FEV_{10} and median dust levels was also strong (r = .82, Fig 5). A source of increase variance in this measurement is diurnal variation in expiratory flow rate which was observed but not adjusted out. The distribution of workers by shift within dust level sub-populations was similar and therefore unlikely to produce a secondary association. Above a median dust level of 1 mg/m^3 the dose-response curves tend to flatten. We suspect that selection, leaving relatively resistant workers in these dustier areas, is responsible for this decrease in prevalence and percent change in $FEV_{1.0}$. As reviewed in the preceding article, there is substantial evidence of selection away from dust exposure in this industry.[9 20 21] In Table 3, a consistent trend toward a higher percentage of black men was found with increasing dust level. Blacks have been found to have lower rates of chronic bronchitis than whites of

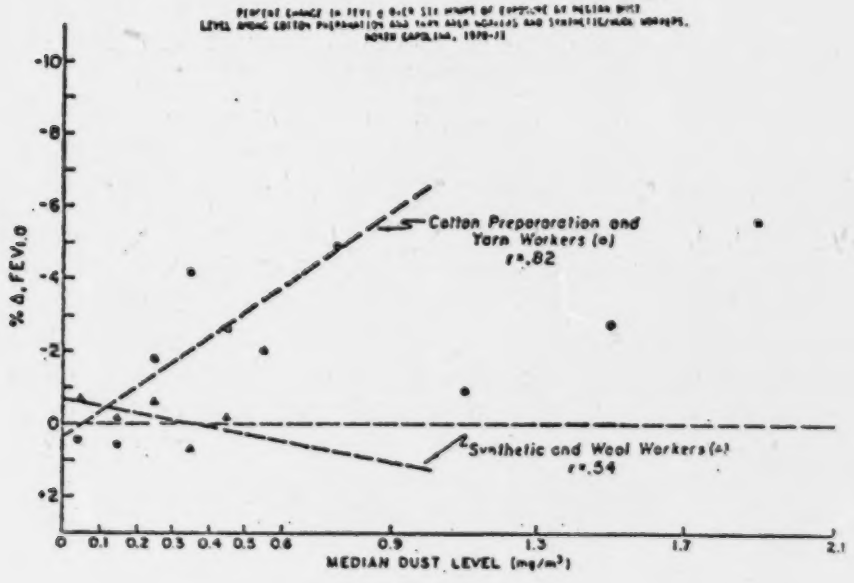


Fig 4.

Table 5.—Raw Data on Percent Change in $FEV_{1.0}$ vs. Median Dust Level among Preparation and Yarn Area Workers in Cotton/Blend Mills and Workers in Synthetic/Wool Mills

Mid-Point of Range of Median Dust Levels (mg/m^3)	Cotton/Blend Mills			Synthetic/Wool Mills		
	n	mean $\%\triangle FEV_{1.0}$	S.D.	n	mean $\%\triangle FEV_{1.0}$	S.D.
0.05	299	0.4	9.4	241	0.7	5.5
0.15	309	0.5	9.8	212	0.2	7.0
0.25	113	−1.8	10.0	141		6.7
0.35	130	−4.2	6.1	112	0.7	7.0
0.45	95	−2.6	16.2	7	0.2	3.3
0.55	35	−2.0	8.8			
0.75	61	−4.9	10.1			
1.10	16	−0.9	10.3			
1.50	12	−2.7	6.0			
1.90	35	−5.6	10.9			

Table 6.—Parameters of Log 10-Probit Dose-Response Curves and Three Points on Each Fitted Curve with Their 95% Confidence Limits

Group	Intercept (a)	Slope (b)	Expected Prevalence (%) .1 mg/m^3	.2 mg/m^3	.5 mg/m^3
1	4.826	1.108	10.0% (7.3-13.3)	17.1% (14.2-20.5)	30.6% (25.9-35.6)
2	4.641	1.301	4.9% (2.8-7.9)	10.2% (7.5-13.6)	22.7% (17.0-29.3)
3	4.718	1.226	6.5% (5.0-8.5)	12.7% (10.8-14.9)	25.8% (22.5-29.3)
4	3.966	2.134	0.08% (0.01-0.7)	0.6% (0.1-2.1)	4.7% (2.7-7.7)
5	3.944	1.170	1.3% (0.7-2.3)	3.0% (2.1-4.3)	8.0% (6.1-10.2)
6	4.269	1.304	2.1% (1.3-3.3)	5.0% (3.8-6.6)	13.0% (10.7-15.8)

the same age and environmental exposure.[22] The relatively greater number of blacks with relatively lower response at high dust levels in this textile population may represent another example of ethnic difference in susceptibility to the biological manifestations of inhalants. Further analyses of this data are being done to determine whether this is a sociological or a biological problem.

Another important observation concerning these dose-response curves is that there appears to be no threshold beneath which no one with Monday chest tightness was found (Table 4). This indication that low dust concentrations result in measurable effects suggests that cotton

Table 7.—Predicted Dust Levels and Their 95% Confidence Limits for Arbitrary Levels of Prevalence of Byssinosis

Prevalence	Predicted Dust Level (mg/m3)					
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1%	.011 (.004-.022)	.031 (.010-.056)	.021 (.012-.033)	.25 (.12-.36)	.082 (.042-.12)	.060 (.034-.085)
2%	.020 (.008-.035)	.050 (.020-.081)	.036 (.021-0.51)	.33 (.19-.45)	.14 (.086-.19)	.097 (.063-.13)
3%	.029 (.013-.047)	.068 (.031-.10)	.050 (.032-.068)	.40 (.25-.52)	.20 (.13-.26)	.13 (.091-.17)
4%	.038 (.019-.059)	.085 (.044-.12)	.063 (.043-.084)	.46 (.31-.58)	.25 (.18-.33)	.16 (.12-.21)
5%	.047 (.025-.071)	.10 (.057-.15)	.077 (.054-.10)	.52 (.36-.64)	.31 (.24-.41)	.20 (.15-.25)
10%	.10 (.065-.14)	.20 (.14-.26)	.15 (.12-.18)	.77 (.62-.90)	.64 (.49-.93)	.38 (.31-.46)
25%	.35 (.28-.47)	.57 (.41-.97)	.48 (.40-.59)	1.5 (1.2-1.9)	2.1 (1.4-4.6)	1.1 (.84-1.6)
50%	1.4 (.97-2.6)	1.9 (1.1-5.5)	1.7 (1.2-2.7)	8.1 (2.2-5.4)	8.0 (3.9-28.5)	3.6 (2.3-7.4)

dust is a highly biologically active inhalant. British studies reported by Molyneaux and Berry [15] also found no threshold for the biological effects (byssinosis and simple bronchitis) of respirable dust ($<7\mu$-Hexlet) and middle fraction dust (7μ to 2mm-Hexlet). Although these dust fractions and the vertical elutriator dust fraction are not strictly comparable, they do contain much of the same dust distribution. When their dose-response regressions are plotted with those presented in this paper, there is good general agreement both in origin and slope. At 0.2 mg/m^3, both sets of curves reveal roughly 15% with some grade of byssinosis. As has been observed before, surprising uniformity in byssinosis prevalence has been found in cross-sectional surveys despite differing populations, working conditions, and frequently somewhat different methods of study.

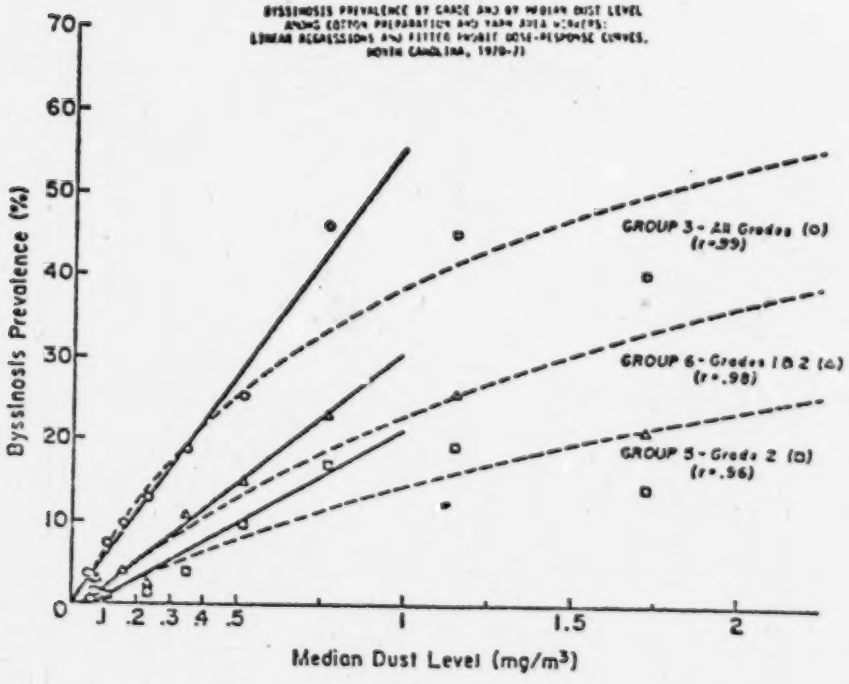


Fig 5.

Table 8.—Chi-Square Tests for Goodness-of-Fit of the Log-Probit Model and for Parallelism of Pairs of Fitted Lines.

Group	Goodness-of-Fit x^2	df	P	Parallelism x^2	df	P
1	6.0	8	.65			
2	14.1	8	.08			
3	7.5	8	.52			
4	3.8	5	.58			
5	8.3	8	.60			
6	10.0	8	.26			
1 & 2	20.1	16	.21	0.53	1	.47
3 & 4	11.3	13	.59	6.0*	1	.015

Symbols: df = degrees of freedom

P = probability of x^2 as large or larger than observed value

* = significant at the .05 probability level

Table 9.—Relative Toxicities and Their 95% Confidence Limits

Byssinosis Groups	Prevalence P	Relative Toxicity R	95% Confidence Limits
1 & 2	All levels	.56	.35 to .83
3 & 4†	.01	.09	.04 to .17
	02	.11	.06 to .19
	.03	.12	.08 to .20
	.04	.14	.09 to .21
	.05	.15	.10 to .22
	.10	.20	.15 to .26
	.25	.32	.24 to .43
	.50	.56	.32 to .96

Symbols: P = No. of subjects with byssinosis/total No. of subjects

R = ratio of dust levels producing same prevalence (eg., dust level for group 1/dust level for group 2)

† = Note: Dose response curves for groups 3 and 4 are non-parallel, so that relative toxicity varies with level of prevalence

The log-probit model was found to fit this data well and offers the opportunity to consider prevalence at fixed dust levels and conversely, calculate dust levels from any given level of prevalence. This is clearly very useful when considering data for setting standards. Probit analysis (Table 6) shows the expected byssinosis prevalence for all grades of byssinotics at 0.2 mg/m^3 to be 12.7%, while only 3.0% for Grade 2 byssinotics. In order to determine what a reasonably safe level of lint free dust might be, the question is raised whether all grades of byssinosis or only Grade 2 byssinosis prevalence is the appropriate indicator. We concluded that overall byssinosis prevalence best estimated byssinosis risk since it was likely to be less affected by selection than Grade 2 byssinosis. In our experience, workers usually do not consider selecting themselves out of exposure if they have only occasional chest tightness or tightness which is not severe and confined to Monday. Those with tightness on Monday and other days (Grade 2) frequently also complain of dyspnea and fatigue; as a result it is not uncommon to find that these workers request a change in job location. Therefore, those with Grade 2 byssinosis symptoms are likely to represent a highly selected group which would very likely result in an underestimation of risk.

Also to be considered is the sensitivity of the biological indicators used in this study; the standard indicators in studying the effects of cotton dust have been byssinosis symptoms and change in $FEV_{1.0}$. There is now evidence that use of flow-volume loops [9 23 24] and measurement of the leukocyte response [24] increase sensitivity in detecting biological effects. Therefore, because of selection and because the indicators of response in developing this dose-response data although well standardized are probably still dull tools, we conclude that, for cotton and blend mill preparation and yarn areas, a reasonably safe level of cotton dust exposure is 0.1 mg/m^3. Even at this low level an expected byssinosis prevalence of 6.5% was found by

probit analysis. A separate level of 0.75 mg/m^3 is suggested as a reasonably safe level in slashing and weaving areas. It will be necessary to include in any cotton dust standard provisions for periodic testing of workers to detect those most susceptible and to avoid placement of those with impaired lung function in dusty areas.

Dust Control.—There is now substantial evidence that biological effects result from low levels of lint-free cotton dust exposure, even with relatively crude indicators of response. To make the cotton textile mill working environment reasonably safe, very great strides must be taken in controlling fine dust. Initially, this requires a reorientation in thinking regarding dust handling from suppressing primarily lint to suppression of fine dust as well. Currently, machine exhaust and ventilation and filtration systems are designed primarily to control lint and large dust particles and not fine dust. As a result, the workroom frequently appears lint free and relatively clean, yet lint free dust levels may be relatively high. To solve this problem, two basic approaches may be taken. One is the traditional approach of dust control after the dust has been introduced into the mill; the second is removal of dust from lint prior to manufacturing. Clearly, the most desirable approach would be a method to harvest cotton without contamination with trash. New methods to improve picking are now under consideration. Dust reduction at the ginning stage would be the next most desirable location to control dust. There is now experimental evidence that the application of steam to cotton is compatible with manufacturing and reduces lint free dust levels and biological activity by roughly one half.[19] A plant wide intervention trial is now underway to test the effectiveness of steaming under manufacturing conditions. The feasibility of steaming cotton at a gin is also being tested. Although steaming may provide improvement in environmental conditions, it is apparent that

much improved dust control, particularly in preparation areas will also be required.

Table 2 shows that lint free dust levels are particularly high in the preparation areas of cotton mills. Review of dust levels from six cotton mills (three from this study; 670 samples) revealed vertical elutriator median dust levels of 1.50-1.59 mg/m^3 in opening and blending areas, 1.60-1.69 mg/m^3 in picking areas, 1.70-1.79mg/m^3 in carding areas, then dropping to 0.70-0.79 mg/m^3 in drawing, 0.40-0.49 mg/m^3 in roving, 0.20-0.29 mg/m^3 in spinning, winding and twisting, and then up again in weaving to 1.00-1.09 mg/m^3. In eleven blend mills (50% cotton or less), two of which are part of the study reported in this paper, 1232 vertical elutriator dust samples found a median dust level of 0.30-0.39 mg/m^3 in opening and blending, 0.50-0.59 mg/m^3 in picking, 0.60-0.69 mg/m^3 in carding, 0.30-0.39 mg/m^3 in drawing, 0.10-0.19 mg/m^3 in roving, 0.00-0.09 mg/m^3 in spinning. 0.10-0.19 mg/m^3 in winding and twisting and 0.50-0.59 mg/m^3 in weaving areas.[10] In these eleven blend mills, the spinning and weaving areas show median dust levels that may be considered reasonably safe and levels in roving, winding and twisting approach this level. Since less than 10% of the work force is employed in areas preceding roving, roughly 90% of those working in these eleven blend mills could be considered as working in a reasonably safe or marginally safe working environment. Those remaining, although exposed to hazardous dust levels, are working in a third or less the dust concentration of their counterparts in cotton mills.

By contrast, it appears from these figures that there is no work area in the cotton mills that could be considered reasonably or marginally safe, although yarn processing and weaving areas are not far from these levels. The areas clearly in acute need of attention are those of opening, blending, picking and carding. Because drawing

and roving are almost invariably in the same work area as the carding engine, much of the dust exposure in these latter two areas probably arises from the carding engine. To protect these workers, the carding area should be partitioned from drawing and roving and each area provided with an independent ventilation system. Under such conditions the dust levels in drawing and roving are expected to more closely approximate those in spinning. Close attention to recirculation of lint free dust ($< .05$ mg/m^3)[25] should further reduce dust levels to more acceptable levels. Preprocessing removal of fine dust by steam may also contribute to achieving safe levels in these areas. But even if steaming were to reduce dust levels by a half, the processes of opening, blending, picking and carding will require efficient exhaust systems. Fortunately, in each of these machines, the area in which the fiber is most vigorously processed is in a relatively enclosed part of the machine. Further enclosure of each of these machines with well designed exhaust systems does not appear to be insurmountable. Efficient removal of fine dust, without recirculation, should markedly improve these preparation areas and perhaps could also remove some dust which previously was released from the yarn in subsequent processes, thereby contributing to control in these work areas.

In summary, the following statements can be made:

1. This study confirms the finding of others, that a strong linear association exists between prevalence of byssinosis and decrement in expiratory flow rate with concentration of lint free dust.

2. The log-probit model, curves of which followed the linear regression plot below 0.5 mg/m^3, fit this data well and provided both expected byssinosis prevalence and conversely expected dust levels, both of which proved to be useful in interpretation of the dose-response relationship.

3. Based on these curves, it is concluded that a reasonably safe level of lint free cotton dust is 0.1 mg/m^3, a level at which nearly 94% of the population exposed were found to have no symptoms of byssinosis. A separate level of 0.75 mg/m^3 is suggested for slashing and weaving areas.

4. Probit dose-response curves for smokers and those who never smoked, showed that smokers had a signficantly higher prevalence of byssinosis.

5. The vertical elutriator cotton dust sampler, over a period of two years, has proven to be a durable and practical instrument which collects a biologically active lint free fraction of dust linearly associated with indicators of biological response.

6. Lint free dust levels by work area suggest that no work areas in the cotton mills sampled had reasonably safe dust levels and that the areas of opening through carding had very high levels. By contrast, in blend mills all areas beyond drawing had reasonable safe or marginally safe dust levels while levels preceding roving are considered only moderately elevated.

7. It is recommended that carding machines be isolated from drawing and roving processes by partitioning and the use of independent ventilation systems.

8. Serious attention should be given to more complete enclosure of opening, blending, picking and carding machines and design of a highly efficient exhaust system to remove fine dust.

9. At the present time, a successful occupational health program for the cotton textile industry should include efforts to remove or reduce dust prior to processing, efficient machine exhaust and ventilation systems, and medical surveillance to detect susceptible workers before they acquire permanent pulmonary impairment.

The authors express their appreciation for the guidance of Drs. Ben Drake and Martin Hines, the advice of Drs. Carl Shy and Al Tyroler, data processing provided by Joe Bouchard and Jim Holmes, the advice and contribution of Howard Ayre, Jerry Lynch and Kenneth Busch in analysis of data, and for the cooperation and participation of the employees and management of Burlington Industries.

References

1. Collis EL: Industrial pneumoconioses with special reference to dust phthisis (Milroy Lectures, 1915), *Public Health* 28:252-253, 1915; 29:11-20, 37, 44, 1916.

2. Roach SA and Schilling RSF: A clinical and environmental study of byssinosis in the Lancashire cotton industry, *Brit J Industr Med* 17:1-19, 1960.

3. Committee on Threshold Limit Values for Airborne Contaminants, Threshold Limit Values for 1971, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1971.

4. Schilling RSF: The history of byssinosis and the British experience. Transactions of the National Conference on Cotton Dust and Health, pp. 7-12, 19-20, University of North Carolina, Chapel Hill, North Carolina, 1970.

5. McKerrow CB, et al: The size of cotton dust particles causing byssinosis: An environmental and physiological study, *Brit J Industr Med* 19:1-8, 1961.

6. Wood CH, Roach SA: Dust in cardrooms: A continuing problem in the cotton-spinning industry, *Brit J Industr Med* 21:180-186, 1964.

7. Molyneaux MKB, Tombleson JBL: An epidemiological study of respiratory symptoms in Lancashire mills, 1963-1966. *Brit J Industr Med* 27:225-234, 1970.

8. Hammad YY, Corn M: Hygienic assessment of airborne cotton dust in a textile manufacturing facility, *Amer Industr Hyg Assoc J* 32:662-667, 1971.

9. Merchant JA, et al: Byssinosis and chronic bronchitis among cotton textile workers, *Ann Int Med* 76:423-433, 1972.

10. Lumsden JC, et al: Cotton dust sampling. In preparation.

11. Merchant JA, et al: An industrial study of the biological effects of cotton dust and cigarette smoke exposure. Proceedings of the 1972 Skytop Conference on Respiratory Disease in Industry, *J Occ Med* 15:1973.

12. Busch KA: Probit analyses of data on prevalence of byssinosis in working populations exposed to cotton dust. National Institute for Occupational Safety and Health Memo. February, 1972.

13. Finney DJ: Probit Analysis, A Statistical Treatment of the Sigmoid Response Curve, Cambridge University Press, 1962.

14. Lynch JR: Air sampling for cotton dust. Transactions of the National Conferences on Cotton Dust and Health, pp. 33-43. University of North Carolina, Chapel Hill, North Carolina. 1970.

15. Molyneaux MBK, Berry G: The correlation of cotton dust exposure with the prevalence of respiratory symptoms. Proceedings of the International conference on Respiratory Diseases in Textile Workers. pp. 177-183. Alicante, Spain, 1968.

16. Schilling RSF: Epidemiological studies of chronic respiratory disease among cotton operatives, *Yale J Biol Med* 37:55-74, 1964.

17. Carey GCR et al: Byssinosis in flax workers in Northern Ireland. HMSO, Belfast, 1965.

18. Batawi MA El, et al: Byssinosis in the Egyptian cotton industry: changes in ventilatory capacity during the day, *Brit J Industr Med* 21:13-19, 1964.

19. Merchant JA, et al: Preprocessing cotton to prevent byssinosis. In press, *Brit J Industr Med.*

20. Gandevia B, Milne J: Ventilatory capacity changes on exposure to cotton dust and their relevance to byssinosis in Australia, *Brit J Ind Med* 22:295-304, 1965.

21. Elwood PC: Respiratory symptoms in men who had previously worked in a flax mill in Northern Ireland, *Brit J Industr Med* 22:38-42, 1965.

22. Densen PM et al: A survey of respiratory disease among New York City postal and transit workers, *Environ Res* 1:265-286, 1967.

23. Bouhuys A, et al: Maximum expiratory flow rates in induced bronchoconstriction in man, *J Clin Inv* 48: 1159-1168, 1969.

24. Merchant JA, et al: Assessment of clinical indicators of response to cotton dust. International Conference on Biological Responses to Organic Agents. Transactions of the New York Academy of Sciences, in press, 1972.

25. The Advisory Committee to the National Conference on Cotton Dust and Health. The Status of Byssinosis in the United States, *Arch Environ Hlth* 23:230-234, 1971.

Supported in part by a grant from National Institute of Environmental Health Sciences. Grant No. 2TO1ES-00124 and by a grant from the National Institute of Occupational Safety and Health, Grant No. SR01 OH00302.

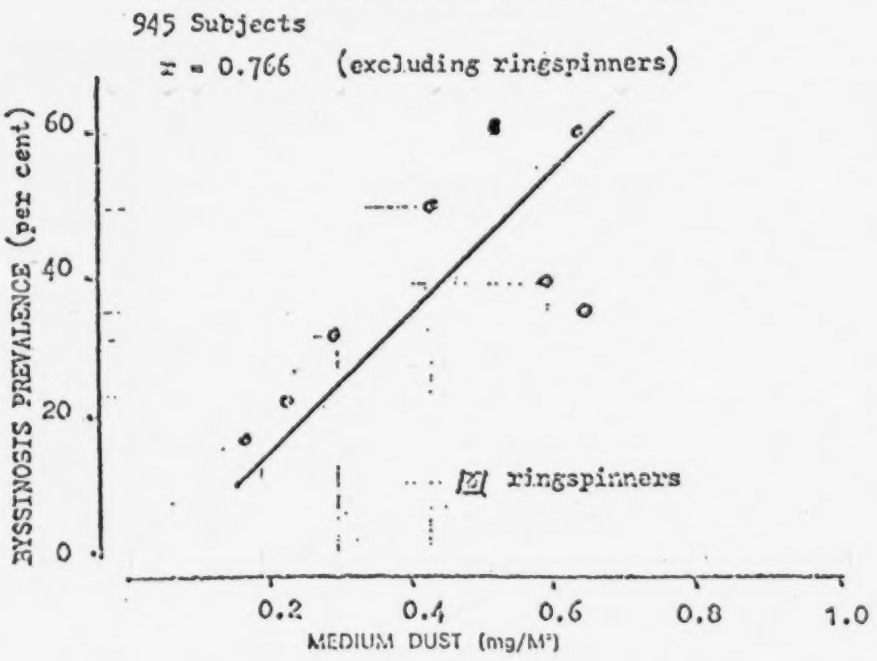
EXHIBIT 6-55

Molyneux & Berry, "The Correlation of Cotton Dust Exposure With the Prevalence of Respiratory Symptoms"

* * * * *

FIGURE 4

CORRELATION. BYSSINOSIS IN FIVE OCCUPATIONS



181

FIGURE 5
CORRELATION. BYSSINOSIS IN SPEEDFRAME TENTERS

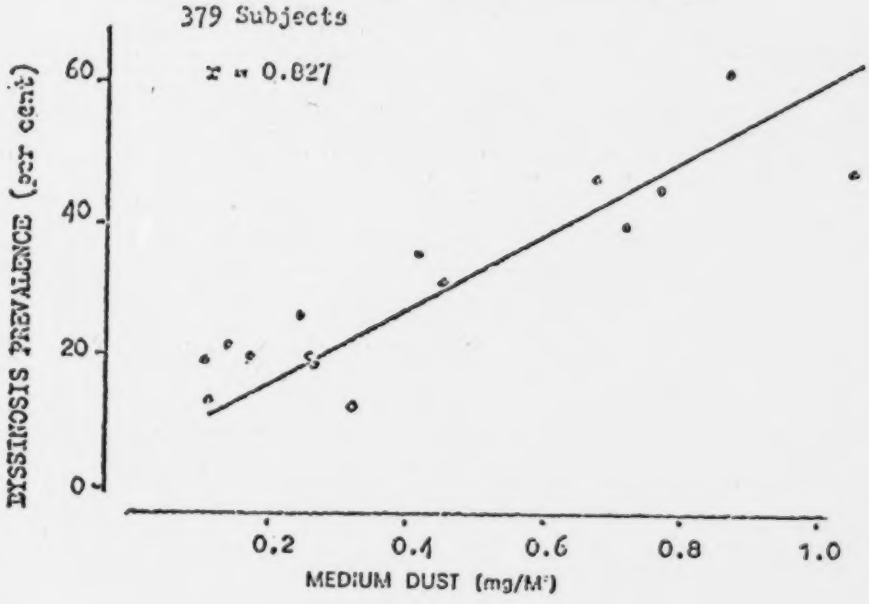


FIGURE 6
CORRELATION SIMPLE BRONCHITIS in non smokers (35-54 years)

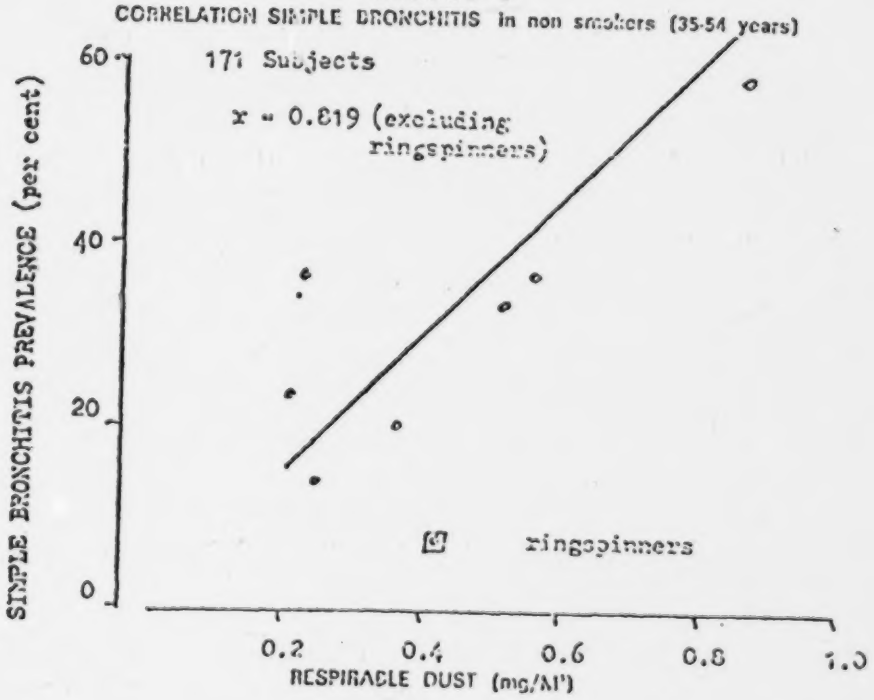


EXHIBIT 6-57

Experience with Medical Surveillance Programs

By: Harold R. Imbus, M. D., Sc.D.
Medical Director
Burlington Industries, Inc.

* * * * *

Nevertheless, one can see the marked difference in the incidence of symptoms of tightness in the chest and in the decline of FEV_1 in these employees. Only one employee has Grade I byssinosis. This is now becoming a manageable situation in which medical surveillance can identify susceptible individuals, monitor their respiratory function periodically, advise regarding respirators, and smoking habits, and even consider transfer if necessary.

Table II illustrates the card room of another plant. In early 1971 an initial survey was done. Dust levels were high and Column 1 shows clearly that there is a significant problem and something needed to be done.

Clearly there was little more that a medical surveillance program could do than to identify the problem, which was too much dust. Control measures were instituted shortly thereafter with installation of new card cleaning equipment. You can see from Column 2 that dust levels were lowered by about two-thirds and so was the percentage with symptoms of byssinosis. Decrement in FEV_1 was also decreased significantly. However, further improvement here is highly desirable. Unfortunately, many tex-

tile plants find themselves in this position, having installed ventilation equipment, in the last few years, at large expense, which though what was generally available, is not adequate to control the byssinosis problem. At this time, an entirely new installation of chute feed carding is in process in this plant and dust levels will be much lower in the near future. Likewise, it is anticipated that the number of reactor employees will be much lower.

Table III, left side, illustrates a survey of a card room and drawing area in a rather large cotton blend plant which has spun cotton yarn for many years. Dust levels in both areas are approximately .4 milligram per cubic meter. In the card room, no employee has symptoms of byssinosis and only one (3%) had a decrement of 10% or more in FEV_1. It is seen that average FEV_1 actually increases during the working day. In the drawing area, 3.2% have byssinotic symptoms and 6.5% have a decrement of FEV_1 of 10%, an average decrement of 48cc, about what we have at our Corporate Headquarters. This plant uses a higher grade of cotton blend and it appears that we have an entirely manageable situation. With medical surveillance, any employee having problems can be detected early and protected either with a respirator or by transfer.

On the other hand, Table III, right side, shows a small area in another plant with dust levels somewhat comparable, but incidence of symptoms and decrement of FEV_1 is much greater. Other areas in this plant were found to have even higher dust levels, but I show these areas because dust levels are in the same "ball park." This is a 100% cotton plant. Even though dust levels here do not look inordinarily high, it is obvious that further action needs to be taken to lower them, and medical surveillance is strictly an interim measure.

* * * * *

The point I am trying to make by using these examples is that in order for a medical surveillance program to provide any real protection you must first of all have a manageable situation.

* * * * *

We believe that medical surveillance programs can provide protection for employees when combined with environmental control. They offer a valuable tool, in addition to dust measurement, for evaluation of the effect of that environment upon employees. They can identify the employee who has a problem and provide him with medical assistance and in receiving benefits that are due him. They can identify the employee who is an increased risk, inform him, and help him to take necessary measures to protect himself. Medical surveillance programs are not a substitute for diligent efforts to control dust.

* * * * *

EXHIBIT 6-66

An Epidemiological Study of Respiratory Symptoms in Lancashire Mills, 1963-66

M.K.B. MOLYNEUX and J.B.L. TOMBLESON

Department of Occupational Health, University of Manchester and H.M. Medical Inspectorate of Factories

Molyneux, M.K.B., and Tombleson, J.B.L. (1970). *Brit. J. industr. Med.*, 27, 225-234. An epidemiological study of respiratory symptoms in Lancashire Mills, 1963-66. An epidemiological study of card and blowroom workers in 14 cotton spinning and two man-made fibre spinning mills in Lancashire had been carried out on a prospective basis of six-monthly examinations over three years. The number of operatives to be included was decided so as to give a sufficient sample for the statistical assessment of fall in FEV, at the same time allowing for population movement. The examination of each worker included a history, a questionnaire of respiratory symptoms, and a measurement of forced expiratory volume in one second. The results in this paper, which will be followed by others on other aspects of the survey, give the prevalence of both byssinosis and bronchitis, according to the definition given, in the 1,359 cotton workers and 227 man-made fibre workers, seen at least once, and also the dust levels in the mills. Eight of the mills processed coarse and six medium cotton.

The total prevalence of byssinosis, as defined in 26.9%, being higher in coarse than in medium cotton mills, and the occupational groups most affected are strippers and grinders, carders and undercarders, and draw frame tenters. In coarse mills symptoms develop in some men and women within the first four years of exposure, and in medium mills between five and ten years' exposure. Repeat questionnaires in about half the population, two

years after the first questionnaire, showed the development of symptoms of chest tightness in an appreciable number not previously affected. The incidence of bronchitis is increased in operatives with symptoms of byssinosis, but is influenced by age and smoking.

Total dust levels averaged 3.1 mg/m³ in coarse mills and 1.2 mg/m³ in medium mills. The findings indicate that dust control measures, though they have produced considerable improvement, are not now fully effective with present methods of production.

* * * * *

TABLE 3

BYSSINOSIS: PREVALENCE (%) IN POPULATION SEEN

Grade	*All cotton*			*Man-made fibre*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*
½	6.9	6.7	6.8	1.0	2.3	1.8
I	13.8	12.7	13.2	3.1	1.5	2.2
II	7.6	6.2	6.8	0.0	0.8	0.4
Total	28.3	25.6	26.7	4.1	4.6	4.4
No.	566	793	1359	97	130	227

TABLE 4

BYSSINOSIS: PREVALENCE (%) IN 10 OCCUPATIONS IN MEDIUM AND COARSE MILLS

Occupation	Mill	Prevalence (%)				Total No.	Mean exposure (yr)
		Grade ½	Grade I	Grade II	All grades		
Blowroom and cotton chamber (male)	Medium	6·0	12·0	6·0	24·0	50	9·7
	Coarse	6·4	4·3	3·2	13·8	94	11·8
Carder, undercarder (male)	Medium	5·3	23·7	7·9	36·8	38	19·1
	Coarse	14·5	14·5	10·9	40·0	55	19·2
Stripper and grinder (male)	Medium	9·2	22·4	17·1	48·7	76	18·5
	Coarse	9·9	34·1	14·3	58·2	91	17·0
Card tenter (female)	Medium	0·0	7·9	2·6	10·5	38	13·9
	Coarse	8·6	17·1	0·0	25·7	70	9·6
Drawframe tenter (female)	Medium	7·5	9·4	13·2	30·2	53	20·0
	Coarse	11·4	14·8	14·8	40·9	88	22·2
Speedframe tenter (female)	Medium	6·0	9·0	6·0	21·0	167	28·0
	Coarse	7·6	20·5	6·7	34·8	210	26·8
Comber tenter (female)	Medium	6·0	10·0	0·0	16·0	50	14·3
	Coarse	—	—	—	—	(0)	—
Ring spinner (female)	Medium	—	—	—	—	(0)	—
	Coarse	3·7	3·7	3·7	11·1	108	18·0
Labourer (male)	Medium	0·0	0·0	4·0	4·0	25	8·3
	Coarse	4·8	0·0	0·0	4·8	42	6·8
Wasteman (male)	Medium	—	—	—	—	(2)	—
	Coarse	15·4	0·0	7·7	23·1	13	14·5

EXHIBIT 6-73

Schilling, *et al.*, "Cardiovascular Disease in Cotton Workers"

* * * * *

Sources of Unreliability in Mortality Rates

Many doctors certify multiple causes of death from which the Registrar General must select one for computing death rates for specific diseases. The practitioners often cannot verify their diseases either by necropsy or special investigation. Thus both the Registrar General and the general practitioner introduce possible sources of error into the mortality rates ascribed to specific diseases. And as the habit of multiple certification has become more common in recent years, the secular trends in the mortality rates of certain diseases may therefore be seriously misleading.

Multiple Certification.—When the medical practitioner gives more than one cause of death on the certificate the Registrar General selects one according to certain rules. In 1921-23 and 1930-32 any definite diseases of the heart or kidneys was preferred to any disease of the respiratory system when both were mentioned together. In 1939 the Registrar General's selection rules were revised. Preference is now given to the disease which, as far as can be ascertained was, in the opinion of the certifying medical practitioner, the starting point of the sequence leading up to the immediate cause of death. The effect of adjusting bronchitis and cardiovascular death rates for 1921-23 and 1930-32 in the light of this revision cannot be shown accurately, but it is possible to get some idea of the likely change from two different sources—the Registrar General's statistics for 1939 (the year of change), when he classified all the death certificates according to both new and old rules, and from a review of the death certificates of card room workers, applied by the trade unions. The latter is a source of information often available but seldom used.

The relevant conclusion of the Registrar General (1947) as regards our particular problem is:

> "Bronchitis and asthma death rates have been affected considerably . . . by the increasing mention of myocardial degeneration as a contributory cause of death and consequent classification by the (old) rules of selection, of increasing numbers to heart disease."

He gives conversion factors so that an estimate may be made of the number of deaths before 1939 from diseases, of the myocardium among the general population which would be put back to respiratory deaths if the new selection rules applied. For bronchitis in *all* males there is added 0.237 times the number of deaths which were previously ascribed to diseases of the myocardium. But for groups with a high respiratory mortality a higher proportionate transfer should be made. There is, however, another method available for the very necessary interpretation of the Registrar General's rates of cardiovascular and respiratory mortality before 1939. But it must be emphasized that it is a highly tentative procedure. In 1939, when deaths were given classified under both rules, the bronchitis deaths under the new classification were increased by transference from disease of the myocardium, endocarditis, and arteriosclerosis from amounts varying from 30% at ages 25-34 to 114% at ages 65-69. If these age-specific conversion factors are applied at the appropriate ages, the death rates from cardiovascular causes in 1930-32 are reduced by the following amounts for ages 25-69 (Tables C and E).

Weavers	8%
Spinners	10%
Strippers and grinders	24%
All males	10%

We have assumed that practitioners combined bronchitis and heart diseases on their death certificates in much the same proportions in 1930-32 as in 1939 and that the practice was similar among practitioners in cotton areas as elsewhere.* We have no means of verifying these two proportions, but if our assumptions are reasonable, cardiovascular death rates for strippers and grinders would be reduced under the new system of classification by more than twice as much as the similar rates for all males and the other cotton groups.

Death certificates of 256 card and blow room workers, or known ex-card and blow room workers, of all ages in the Rochdale, Oldham, and Bury areas, obtained from the trade unions, were examined. These covered a period from 1941 to 1948. In Fig. 4 the effect of the change in methods of classification is shown for the 25-69 age group in which there were 164 deaths.

Of the 24 additional deaths from respiratory causes under the new system of classification, 19 were transferred from diseases of the myocardium, three from endocarditis, one from "other heart diseases", the remaining one coming from chronic rheumatism. This transference lowers the cardiovascular death rate for ages 25-69 by

$$\frac{23}{67} \times 100 = 34\% \text{ **}$$

This compares with the 24% estimated by the other method.†

---

* As multiple certification continued to increase between 1930 and 1940 we may have overestimated the reduction.

** In addition to transferring 23 deaths from cardiovascular to respiratory causes, two other deaths were transferred to the cardiovascular group from other causes, giving a net loss of 21 deaths as shown in Fig. 4.

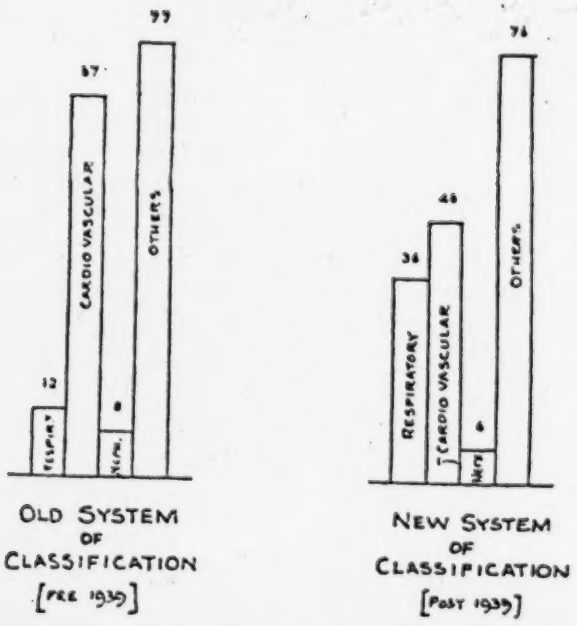
† For all ages, the transference lowered the cardiovascular death rate by 30%.

FIGURE 4

CLASSIFICATION OF CAUSE OF DEATH
OF 164 CARD AND BLOW ROOM WORKERS

1941 - 1948

AGES 25 - 69



The Registrar General (1949) records that in the 1921-30 decennium 33% of all death certificates for non-violent deaths gave "multiple" causes. By 1935 this proportion in all death certificates had risen to 43%. It is reasonable to infer that there was a substantial increase in multiple certification between 1921-23 and 1930-32, which would mean that a higher proportion of respiratory deaths would be allocated to cardiovascular deaths in the latter than in the former triennium. This may be a possible explanation of the opposite secular

trends in cardiovascular and respiratory mortality, and in fact both these death rates may have been falling.

The North IV (Lancashire and Cheshire) region in 1930-32 showed a mortality excess from respiratory diseases over all males at all ages. Some of the cardiovascular mortality excess for this region can be similarly explained. But, even after reclassification by the methods given above, death rates for heart diseases and nephritis for males in North IV are still significantly greater than rates for all males at ages 45 and over, but spinners and strippers and grinders have higher rates than North IV at ages over 55 (Table D). These high cardiovascular death rates for North IV cannot be explained.‡

Errors in Diagnosis.—It is not possible to be certain about the effects on mortality rates of using vague terms to describe causes of death, or of frank errors in diagnosis. The cardiovascular group of diseases includes myocardial diseases and degeneration which are vague labels used for diseases in which the exact pathology is not known. The use of "heart failure" as a cause of death is not favoured by the Registrar General, and for these diseases of uncertain pathology in which cardiac failure is the terminal result, the general practitioner undoubtedly uses "myocarditis" and the like in order to avoid enquiries about his certificates.

We have considered the reallocation to respiratory deaths of certificates on which both cardiovascular and respiratory causes are mentioned; but it is probable that there are some death certificates with no mention of respiratory disease, even though such a disease was the starting point of the pathological changes leading to death. And it is also probable that such an event occurs even

‡ It is of interest that in 1947-8 a similar excess for heart disease is still present, in spite of the new methods of classification.

more often among cotton workers exposed to dust than among all males or men of the same social class, for reasons which will now be discussed.

Byssinosis has been repeatedly described as a disease which closely simulates chronic bronchitis and emphysema, but O'Sullivan found that among 33 men suffering from disabling byssinosis 12 had no clinical evidence of bronchitis. Shaw Dunn, and Sheehan (1932) did necropsies on 10 cotton mill workers, nine of whom had been exposed to dust; while all of these nine had some evidence of chronic bronchitis and emphysema, six showed hypertrophy of the right ventricle, four of whom died of congestive cardiac failure. Thus cotton workers with disabling byssinoisis, with its characteristic asthmatic symptoms, may present a clinical picture of cardiac asthma or congestive cardiac failure, which so masks the respiratory disease that it is not mentioned on the death certificate.

For nephritis it is possible to make more definite assumptions about mistakes in diagnosis.

Platt (1947a) suggests that most of the deaths assigned by the Registrar General to nephritis in the older age groups are not renal deaths at all. In his own 161 cases for which full records were available, the main incidence of deaths from nephritis was under the age of 45. The Registrar General's figures for age incidence are totally different, with the main mortality over the age of 45. Platt's own experience is that many cases of hypertensive cardiac failure with albuminuria are diagnosed by their general practitioners as chronic interstitial nephritis.

Nephritis death rates are particularly high in certain occupations. Greenwood and Russell (1938) showed that in the 1921-23 triennium the textile trades, pottery dippers and file cutters, all of whom had high nephritis death

rates also had a high risk of dying from respiratory disease.

For all occupations there is a significant correlation between the standardized death rates for bronchitis and nephritis in 1921-23 (Table 2). In 1930-32 the same type of occupations appear to have high nephritis death rates—blow room workers and foremen, strippers and grinders, and cutlers—but for this period, as shown in Table 2, there is a significant correlation between the standard mortality ratios of bronchitis and nephritis only for Social Classes III and IV. A possible explanation for this relationship is that many of the men in these trades died of congestive cardiac failure caused by respiratory disease and were certified as nephritis deaths.*

Thus there is some evidence that medical practitioners may fail to distinguish renal disease from other diseases which in their terminal stages simulate renal disease. It seems possible, therefore, that the mortality excess from nephritis in cotton workers may be due to deaths from respiratory disease, which terminates as congestive cardiac failure. If, however, occupational influences cause hypertension, as has been suggested, there will be another reason for high "nephritis" death rates in cotton workers.

Conclusions

In order to get a clearer picture of any occupational mortality excess due either to cardiovascular and respira-

* In the same paper Greenwood and Russell drew attention to the high nephritis death rates in barmen and inn and hotel keepers for whom an excess of alcohol is probable. In the triennia 1921-23 and 1930-32 there is a significant correlation between standardized death rates for nephritis and cirrhosis of the liver. It is possible that this correlation is due to some cases of cirrhosis of the liver which terminally have oedema being misdiagnosed as nephritis. Fishberg (1939) quoting his own experience and that of others is very sceptical of the role of alcohol in producing renal disease.

tory diseases for the triennium 1930-32, cardiovascular and respiratory deaths are given in Fig. 5, added together, for the cotton trades, for all males, and for males of similar social classes to the cotton workers. The occupational hazard of the cotton trades, particularly of the stripper and grinder, is obvious. We know that most of this is respiratory and that in the past respiratory mortality of cotton workers has almost certainly been underestimated; but when a correction is attempted for the respiratory deaths allocated to the cardiovascular group of diseases, there still seems to be an excess of deaths for the cotton workers and particularly so for the strippers and grinders. Thus there may be a real excess of heart disease due to occupational influences. The latter possibility is so important in view of the very high national death rate from cardiovascular diseases and the absence of information on its relation to environmental factors that this clue must be followed up. As Morris (1951) said, cardiovascular disease of middle and old age is one of the darkest areas of vital statistics and at present the main source of information must be the mortality rates. In another paper the results of a clinical investigation of more than 300 men employed in cotton textile mills will be described.

TABLE 2

CORRELATION BETWEEN NEPHRITIS AND BRONCHITIS (AGES 20-64 YEARS)

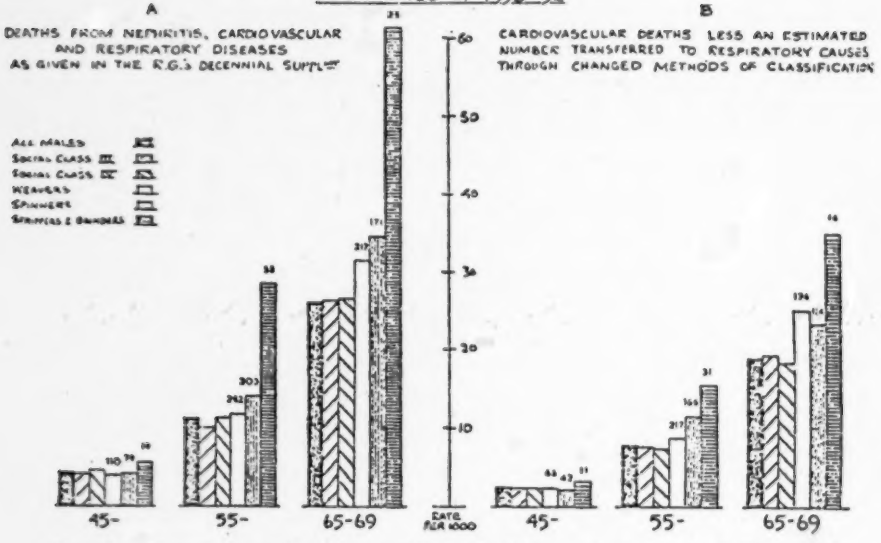
Nephritis and Bronchitis	r	No. of Groups	P
1921-23*	$.38 \pm .04$	164	$P < .001$
1930-32†	$.22 \pm .12$	71	Not significant
1930-32 (Social Class III-V)	$.44 \pm .13$	59	$P < .01$

* From Registrar General's Decennial Supplement, based on C.M.F.'s of all trades and referring to chronic nephritis only.

† Based on S.M.R.'s of trades with 10 or more deaths, and referring to acute and chronic nephritis.

FIGURE 5

DEATH RATES IN 1930-32



Figures above columns for cotton workers are number of deaths upon which rates are based. (See Appendix, Tables C and E.)

Summary

Since 1891 the Registrar General has recorded high death rates from cardiovascular diseases among cotton workers.

It has been suggested that this mortality excess may be due to hyperpiesis caused either by the inhalation of textile dusts or by inbreeding in Lancashire cotton towns.

In this paper the Registrar General's figures are analysed principally for the triennium 1930-32 (the last to be published). It is shown that in the three occupational groups studied, strippers and grinders, weavers and spinners, there is an association between mortality and the extent of dust exposure.

The significantly high death rate of the strippers and grinders (the occupation with the highest dust exposure) from cerebral vascular lesions supports the hypothesis

that hyperpiesis may be the cause of this mortality excess.

Two sources of unreliability in mortality rates are discussed. (1) Since 1920 medical practitioners have entered multiple causes of death with increasing frequency on death certificates. The Registrar General makes rules for selecting one cause of death from certificates with multiple causes. Before 1939 these rules exaggerated cardiovascular mortality and reduced respiratory mortality. Since 1939 more reliable methods of selection have been used, and some of the cardiovascular mortality of cotton workers who it is known have high respiratory death rates from byssinosis can be explained simply by methods of book-keeping. (2) The use of convenient though vague terms such as "myocarditis" to describe causes of death, and errors in diagnosis, particularly of nephritis in the older age groups, may also exaggerate cardiovascular death rates.

When all possible corrections are made for the exaggeration of cardiovascular mortality through the erroneous allocation of respiratory deaths to it, there still remains an excess of cardiovascular mortality particularly for strippers and grinders. This may well be real and may be due to occupational influences.

We should like to thank Dr. J. N. Morris of the Social Medicine Research Unit of the Medical Research Council, Dr. W. P. D. Logan of the General Register Office, Mr. G. Hart of Rugby Mill, Hollinwood, and our colleagues inside and outside our Department for advice and criticism; Mr. A. Robertson, Mr. H. Chorlton and Mr. J. Meadowcroft of the Card and Blowing Room Operatives and Ring Spinners Association.

EXHIBIT 6-76

Research Triangle Institute, Technological Feasibility Assessment and Final Inflationary Impact Statement

Table I-6. Total Installed and Annualized Compliance Costs: all Sectors (Costs in Millions of Dollars)

Industry Sector	Exposure Limit (mg/m^3)	Installed Cost	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
Yarn Production	0.5	211.8	33.8	6.9	20.6	61.5
	0.2	984.4	158.3	15.6	67.9	241.6
	0.1	2,802.7	450.6	23.3	147.0	620.6
Cotton Ginning	0.5	16.9	2.7	4.9	1.8	9.4
	0.2	292.2	47.0	13.2	30.3	90.4
	0.1	343.6	55.2	14.7	35.4	105.3
Cotton Weaving	0.5	9.1	1.5	1.7	0.6	3.7
	0.2	1,387.9	223.1	40.7	86.3	350.1
	0.1	3,939.1	633.2	112.6	245.1	990.9
Waste Processing	0.5	17.3	2.8	2.6	2.5	7.9
	0.2	32.0	5.2	2.9	4.7	12.8
	0.1	56.1	9.0	3.4	8.2	20.6
Total	0.5	255.1	40.8	16.1	25.5	82.5
	0.2	2,696.5	433.6	72.4	189.2	694.9
	0.1	7,141.5	1,148.0	154.0	435.7	1,737.4

* * * * *

III. BENEFITS OF THE PROPOSED STANDARD

1. *Introduction*

This chapter identifies occupational groups exposed to cotton dust, discusses the inherent problems of benefit estimation, and estimates the benefits expected to result from implementation of the proposed standards. Yarn preparation workers and other cotton industry workers are discussed separately herein.

2. *Occupational Groups Exposed to Cotton Dust*

Two large groups of workers known to be exposed to cotton dust are considered in this evaluation. They are:

1) yarn preparation workers, and 2) workers engaged in weaving, ginning, cottonseed oil milling, and industries using cotton waste.

a. *Yarn Preparation Workers*

In August 1971, 338,310 production workers were employed in cotton and man-made fiber mills * in the United States according to a Bureau of Labor Statistics (BLS) survey [1]. Cotton mills employed 193,014 production workers, while man-made fiber mills employed 145,296 such workers. Of the total production workers, an estimated 22,609 were employed in bleaching, cloth dyeing and finishing, and fabricating departments; hence, they were not considered part of the regular textile operations work force. The regular textile operations work force then becomes, by subtraction, 315,701.

At the time of the BLS survey, slightly less than one-half of the industry's production workers were employed in mills manufacturing all or most of their products entirely of cotton fibers and approximately one-fifth were in mills manufacturing products of cotton and man-made fibers (blends). The balance of the production workers (thirty percent of the production work force) were employed in mills manufacturing all or most of their products entirely of man-made fiber.

The BLS survey estimated the number of workers in cotton mills and all textile mills by selected production occupations. The estimates for cotton mill yarn preparation workers were excerpted without change from the BLS report and are shown in Table III-1. The numbers of yarn preparation workers in blend plants, also shown in Table III-1, were obtained by multiplying the BLS estimates for all textile mills by 0.2 (the fraction of

* Includes SIC 2211, Weaving Mills, Cotton; SIC 2221, Weaving Mills, Manmade Fiber and Silk; SIC 2281, Yarn Mills, Except Wool; SIC 2282, Throwing and Winding Mills; and SIC 2284, Thread Mills.

workers in mills manufacturing products of cotton and man-made fibers). Maintenance and miscellaneous worker estimates for both cotton and blend mills were prorated from figures for all textile production employees. The median dust concentrations assigned to the several production occupations listed in Table III-1 are from Merchant, et al. [2], and are measured dust levels from six cotton mills and eleven blend mills. The dust samples were of approximately six hours duration and were collected with the Lumsden-Lynch vertical elutriator.

Inspection of Table III-1 reveals that 105,193 and 21,230 yarn preparation workers are exposed to cotton dust in cotton and blend mills, respectively, and are at risk of developing byssinosis.*

* * * * *

A commonly used measure of the benefit of health programs is the value of future earnings lost due to premature death. Since byssinosis rarely appears as a cause of death on a death certificate, and further, since the relationships are not well defined between cotton dust exposure, byssinosis, and chronic bronchitis-emphysema deaths which are more commonly recorded, lost earnings due to premature death could not be calculated. While excess mortality ** due to bronchitis and pneumonia has been observed in English workers exposed to cotton dust [8], it has not been seen in the limited number of studies of mortality in the U.S. textile industry. Thus, Enterline and Kendrick [9] studied 6,281 white male cotton textile workers aged 15 to 64 as a control population in an examination of mortality in asbestos workers. Using the U.S. white male population as the standard, a Standardized Mortality Ratio (SMR) ([Observed deaths/Expected

---

* Office and yarn dyeing workers are not included.

** More deaths than would be expected in a given population during a given period.

Table III-1. Estimated Number of Yarn Preparation Workers Exposed and Degree of Exposure to Cotton Dust by Job Classification (SIC's 2211, 2221, 2281, 2282, and 2284)

DEPARTMENT AND JOB CLASSIFICATION	COTTON MILLS		BLEND MILLS[a]	
	Number of Workers	Median Dust Concentration (mg/m^3)[b]	Number of Workers	Median Dust Concentration (mg/m^3)[bc]
Opening and picking				
Opener tenders	771	1.50-1.59	247	0.30-0.39
Picker tenders	1,293	1.60-1.69	324	0.50-0.59
Subtotal	2,064		571	
Carding and drawing				
Card grinders	1,273	1.70 - 1.79	333	0.60 - 0.69
Card strippers	123	1.70 - 1.79	32	0.60 - 0.69
Card tenders (finishers)	3,572	1.70 - 1.79	108	0.60 - 0.69
Comber tenders	658	0.70 - 0.79	168	0.30 - 0.39
Drawing-frame tenders	2,804	0.70 - 0.79	903	0.30 - 0.39
Slubber tenders, standard	575	0.40 - 0.49	159	0.10 - 0.19
Slubber tenders, long draft	3,698	0.40 - 0.49	1,034	0.10 - 0.19
Subtotal	12,703		2,737	
Spinning				
Doffers, spinning frame	18,894		2,500	
Section men (fixers)	2,837		824	
Spinners, ring frame	29,012		4,375	
Spinners, frame, other than ring	- - -		12	
Subtotal	50,743	0.20 - 0.29	7,711	0.00 - 0.09
Spooling, winding, and twisting				
Twister tenders, ringframe	1,921		1,308	
Uptwisters (manmade fiber)	- - -		450	
Winders, yarn	30,788		6,315	
Subtotal	32,709	0.20 - 0.29	8,073	0.10 - 0.19
Maintenance and miscellaneous	6,974	0.485	2,138	0.163
TOTAL	105,193		21,230	

[a] Processing 50 percent cotton or less.

[b] Six-hour vertical elutriator samples.

[c] Mixture of cotton dust and other dust present.

Data source: U.S. Department of Labor, Industry Wage Survey, Textiles, August 1971, Part 1. Cotton and Manmade Fiber, Bulletin 1801., Washington, D.C.: U.S. Government Printing Office, 1974.

J.A. Merchant, et. al., "Dose Response Studies in Cotton Textile Workers". J. Occup. Med., Vol. 15, No. 3 (March 1973) pp. 220-230.

Table III-2. Other Workers Exposed to Cotton Dust and Assumed Exposures

SIC	Title	Number of Workers[a]	Assumed Exposure: Operation	Dust Concentration (mg/m^3)	Method	Country	Reference
0724	Cotton ginning	40,446[b]	gin stand	1.02 (median)	vertical elutriator	U.S.A.	3
			baling press	0.48 do	do	do	
			other	0.59 do	do	do	
			overall	0.67 do	do	do	
2074	Cottonseed oil mills	900[c]	seed house	23-590 total dust	filter thimble	Egypt	4
			linter	15-18 do	Greenburg-Smith impinger	Australia	5
			baler	30-37 do	do		
2211	Weaving mills, cotton	83,216[d]	slashing and warping	1.0-1.09 (median)	vertical elutriator	U.S.A.	2
			weave room	1.0-1.09 do	do	do	
			cloth room	1.0-1.09 do	do	do	
			maintenance	1.0-1.09 do	do	do	
2221	Weaving mills, manmade fiber and silk		slashing and warping	1.0-1.09 do	do	do	2
			weave room	0.59 do	do	do	
			cloth room	0.59 do	do	do	
			maintenance	0.59 do	do	do	
2241	Narrow fabric mills	23,500	weave room, blend mill	0.59 do	vertical elutriator	U.S.A.	2
			weave room, cotton mill	1.0-1.09 do	do	do	
2293	Paddings and upholstery fillings	3,500	garnett room	6.06 (mean)	do	do	6
2294	Processed textile waste	3,100	sorting	0.53 (respirable dust)	horizontal elutriator	Egypt	7
			fiber loosening	6.84 do	do	do	
			carding	5.02 do	do	do	
			spinning	1.12 do	do	do	
			felt processing	3.20 do	do	do	
2296	Tire cord and fabric	7,214[e]	weave room	0.59-1.09 (median)	vertical elutriator	U.S.A.	2
2515	Mattresses and bedsprings	23,200	garnett room	6.06 (mean)	do	U.S.A.	6
			tape edge	0.36 do	do	do	
			quilting	0.28 do	do	do	
			box spring	0.43 do	do	do	
			hand tie and coil tack	0.24 do	do	do	
			overall	5.02 do	do	do	

a Obtained from 1972 Census of Manufactures unless noted otherwise.

b If a gin crew is 12.5 workers (National Cotton Council), then in 1972 there would have been 12.5 workers/gin X 3,517 active gins = 43,963 workers. However, 8 percent (3,517) of these are assumed to be office workers. Hence, the workers exposed to cotton dust is estimated as 40,446.

c Twenty percent of production employees (4,500) is assumed based on conversations with industrial representative.

d Adapted from detailed data reported to U.S. Department of Labor, Industry Wage Survey, Textiles, August 1971, Part 1 Cotton and Manmade Fiber, Bulletin 1801. Washington, D.C.: U.S. Government Printing Office, 1974.

e Estimated.

deaths] X 100) of 59.4 was calculated for respiratory disease, indicating that respiratory disease mortality in white male cotton textile workers is less than that of the U.S. white male population. This finding was confirmed and extended in a recent analysis [10]. The results of a study of mortality in female cotton textile workers reported by Daum, et. al. [11] are suggestive of increased emphysema deaths. Given the large number of female workers in the cotton textile industry (about 55 percent of the work force), it is especially unfortunate that hard mortality data are not available. SMR's for chronic bronchitis and emphysema in both male and female cotton textile workers would be especially appropriate for use in this analysis; unfortunately they are not available at this time.

* * * * *

4. *Engineering Controls*

Engineering controls are defined herein as substitution of a less toxic substance for a more toxic one, modification or isolation of a process, or local or general exhaust ventilation for the purpose of reducing or eliminating a worker's exposure to a potentially harmful substance. Thus, dust concentrations in the textile industry may be controlled by modification of the dust-producing processes or operations, or removal of the dust from the environment by ventilation.

a. *Yarn Production*

1) *Process Modification*

The yarn production process is essentially one of fiber cleaning and alignment with the desired goal of removing all material in the cotton except mature fibers, which are then spun into yarn. The dust associated with cotton processing is thus an unwanted residue which is inherent in the operation. Textile processes have changed

little over the past several decades although there have been modifications of some operations, primarily to increase productivity; hence, process modification, other than improved maintenance, has had little effect on dust concentrations. The design of high speed cards did require substantially improved dust capture to avoid production problems arising from the larger volume and greater agitation of materials being processed. On the other hand, open end spinning, which eliminates roving, may produce more dust than ring spinning.

Decreasing machine density in a work area, which is mentioned in the literature as a means of reducing exposure, does not, in fact, reduce the concentration of dust in the room air. Area dust levels would build up more slowly in the larger volume of room air, but would eventually reach the same equilibrium levels if other controls were unchanged. This technique is, therefore, felt to offer little to the solution of the problem of dust control in the textile industry. Replacement of older, low-speed production equipment with more modern, high-speed machines can reduce the generation of dust. However, very fine yarns cannot be produced by the higher speed equipment, so replacement is not a universal solution. Only in instances where large amounts of lower quality yarn are desirable would replacement be applicable. Presently, process modification appears to be a feasible but limited alternative for dust control [2].

2) *Ventilation*

The capture and removal of dust from the air at the point of generation (i.e., local exhaust ventilation) appears to be the most efficient method of dust control at the present time. Effective dust removal in cotton processing areas depends on two factors: capture devices located as close as possible to the point of dust generation and efficient filtration methods [2]. Considering only the technological feasibility of efficient capture devices and filters,

the scope of ventilation control at the dust source could range from complete enclosure of each machine (including total enclosure, ducting, and filtration) to application of local exhaust ventilation hoods and ducts and adequate collection devices.

Most older textile equipment has very few enclosed dust generating points. When local exhaust ventilation systems are included, they are usually retrofitted devices. The efficiency of these devices can be improved significantly by providing as much enclosure of the machine as practicable. By confining the contaminant to a smaller volume, air flow requirements, and hence, energy costs are reduced. Since the air volume required for the majority of the dust capture devices is directly proportional to the capture distance, a reduction of one-half of the capture distance results in a corresponding decrease of one-half of the air volume required, and hence, corresponding reductions in energy requirements. Many of the more modern machines are well enclosed and are equipped with dust capture devices as a standard feature.

There is little variation in the physical configuration of the capture devices required to attain the levels of control ranging from 1.0 to 0.2 mg/m^3. Vendors of exhaust ventilation systems currently prefer to add dust capture pickups, filtration devices, and/or increase airflows to reach desired room concentrations.

The level of dust control effected is generally related to the number and design of local exhaust hoods, air volumes, and the number of filter stages through which the contaminated air passes. By employing a sufficient number of well-designed dust capture devices (e.g., hoods, slots, and plenums), sufficient air volumes, and efficient single-stage filtration, dust levels in the range of 1.0 mg/m^3 (total dust) can generally be expected in the working environment; with two-stage filtration (and air washing), levels not exceeding 0.5 mg/m^3 (V.E.) may be

expected; if efficient third-stage filtration is added (and air washing), workroom dust concentrations should not exceed 0.2 mg/m³ (V.E.) for an eight hour time-weighted average (TWA) for yarn-producing mills. Controls to comply with a 0.1 mg/m³ (V.E.) level of control are currently technologically feasible, but may require complete equipment enclosure and stringent three-stage filtering of both recirculated and make-up air in the ventilation system since dust in the ambient make-up air may on occasion exceed 0.1 mg/m³ (V.E.).

Control of cotton dust concentrations in the yarn manufacturing industry to levels as low as 0.1 mg/m³ (V.E.) thus appears to be technologically feasible by application of existing technology. This assessment is based on RTI's understanding of the processes and operations involved, the amount and velocity of particle release from various dust generation points, and the general capabilities of current engineering controls. It appears that control of dust levels to meet the 0.1 mg/m³ exposure limit will require: (a) complete enclosure of openers and pickers, cards, draw frames, combs, roving frames and spinning frames with air exhaust; (b) filtration of the exhaust air from the enclosures to levels approximating 0.1 mg/m³; (c) recirculation of the filtered exhaust air through the central air conditioning system, where additional cleaning takes place; and (d) filtration of air conditioning make-up air to a level not exceeding 0.1 mg/m³. Such a system is conceptually feasible although no empirical verification can be provided since it apparently has not been tried in any installation. The configuration of the enclosures may be expected to provide the greatest design problems, since it will be necessary to provide numerous access ports and a means to check for operating malfunctions either by direct inspection or by automatic indicators.

* * * * *

2) *Yarn Processing*

Yarn processing is a term used to cover those operations through which yarn may pass after leaving the spinning frame. These include winding, spooling, twisting, warping, and weaving, all of which are described in Appendix A.

Engineering controls are available for four of the five processes cited above; the exception is weaving. Based on information obtained from vendors, local exhaust ventilation systems could be used to maintain median dust concentrations of 0.5 and 0.2 mg/m^3 in areas housing these processes. RTI estimates that the 0.1 mg/m^3 limit could be achieved by adding filtration of the make-up air for the air conditioning system to the local exhaust ventilation systems.

Commercially available engineering controls applicable to weaving processes were not identified and it is, therefore, assumed that none exist. Some experimental work has been done with the concept of using general room ventilation as a dust control measure in weave rooms. This basically consists of modifying existing ventilation systems to produce air currents of such speed and direction as to capture a portion of the dust emitted from the weaving process and then filtering the dust from the air. No information on cost or effectiveness of this control technique is available.

Although the residue of particles of bract, stem, and leaf (the material suspected of being the causal agent in byssinosis) in weaving yarns is relatively very small, there is substantial evidence that enough exists in the dust found in weave rooms to pose a significant hazard for workers exposed over long periods. The bulk of weave room dust, however, apparently is sizing used to treat the yarn and the total airborne dust normally will exceed the 0.1, 0.2, and 0.5 mg/m^3 exposure limits considered

in this analysis, although cotton dust may be only a small portion of the total.

No documentation of engineering controls for looms was found in the course of this study. The discussion that follows is, therefore, entirely speculative. Three kinds of engineering controls may be suggested. Perhaps the simplest and most obvious is to isolate the weave room from other dusty areas. It was observed that in integrated mills the doors connecting the weave room with yarn production areas may stand open during production, with substantial dust drifting into the weave room. Elimination of such a dust source is easy and poses no cost penalty. Similarly, room ventilation systems should be separated so that dust is not introduced through recirculation from dusty areas.

The room ventilation system may be the primary means of lowering dust concentrations in the weave room. A very high air flow through the room, combined with high efficiency filtration, would appear to be appropriate. The use of floor vents drawing air at high rates from under looms may also be used. Another engineering control technologically feasible for control of most looms apparently is local exhaust ventilation. It is probable that hoods can be installed above most looms and that quite high rates of air flow can be employed to capture dust released from the loom or blown off by travelling cleaners where they are employed. Without knowing the range of possible specifications for air flows or distances from hood to dust source (which would require specific preliminary design analysis), it is not possible to estimate the collection efficiencies that can be attained with local exhaust ventilation. Air filtration is less difficult to conceptualize, since high efficiency can be achieved with multi-stage filter systems.

Good housekeeping procedures provide one other obvious control measure that can contribute significantly to

maintenance of low dust levels in the weave rooms. Careful and thorough cleaning of the room weekly to remove accumulated dust from equipment and from the room in general tends to prevent the build-up of excessive dust levels. This should be done at a time when production is shut down.

The aggregate effect of a combined control program such as discussed here is hard to estimate. RTI engineers are of the opinion, however, that such a program may reasonably be expected to achieve an exposure limit of 0.2 mg/m^3 TWA. It is not clear whether a limit of 0.1 mg/m^3 can be attained in this way.

* * * * *

b. *Reduction of Workers Exposure: Yarn Production Mills*

A wide range of engineering controls are technologically feasible to control dust levels in yarn mills. The industry naturally has chosen methods that are most cost effective. The controls specified herein as most probable for compliance with the proposed standards are those now in use, modified to achieve the required efficiencies. Their feasibility has been demonstrated and they are readily available from vendors. These controls reduce the dust concentration in the work area by capturing and removing the dust as it is generated through the use of local exhaust ventilation on production equipment. A typical system consists of dust capture devices (such as hoods or enclosures over dust emission sources), ducts for transporting the contaminant, and a filtration system for eliminating the dust from the airstream. These systems are discussed in Chapter IV and Appendix A.

Basically, the physical configuration of local exhaust ventilation systems is independent of the dust concentration considered. However, differences do arise in the additional stages of filtration required to control at the lower dust concentrations and in the dust capture devices and air volumes. The plant areas in which the systems

are employed also affect the control strategy required to comply with different levels of control. To achieve dust concentrations not exceeding 1.0 mg/m^3, it is assumed that local exhaust ventilation systems are now employed on opening, picking, carding and drawing operations and that a single stage of filtration is used. To achieve dust concentrations not exceeding 0.5 mg/m^3 (V.E.), RTI's analysis indicates that, in addition to the above operations, local exhaust ventilation will also be applied to combing, roving, and spinning operations and that two stages of filtration will be employed. To achieve dust concentrations not exceeding 0.2 mg/m^3 (V.E.), these data indicate that ventilation systems will be applied to the same operations with a third stage of filtration added, consisting of either an electrostatic precipitator or a high efficiency bag filter. Control to the 0.1 mg/m^3 limit requires enclosure of equipment, exhaust to high efficiency filters, and filtering of air conditioner make-up air.

In addition to engineering controls, a program to reduce worker exposure through improved specific work practices designed for each work position will be instituted. Although no specific modifications in work practices are suggested, for costing purposes it was assumed that a study of the work practices for a total of 21 work positions will be instituted by firms in the industry to identify possible improvements and workers will be given appropriate training based on the findings of the study. The type of work practice changes that may be instituted are discussed in Chapter IV.

During cleaning operations and certain other operations, such as waste collection and bale opening, which require manual handling of cotton fiber, the described ventilation controls are not adequate to maintain the exposure of the individuals involved in these operations at acceptable levels (see Chapter IV). Therefore, the probable methods of compliance include the use of per-

sonal protective devices for these individuals. Specifically, it is assumed that respirators are used by all individuals involved in blow down, stripping, grinding, dry sweeping, and manual trash collection. It is also assumed that disposable respirators are the most probable choice of the industry.

* * * * *

4. *Compliance Costs*

Costs associated with the implementation of controls to attain proposed cotton dust standards fall into two general categories:

- costs associated with the installation/operation of engineering controls
- costs associated with ancillary programs, e.g. medical surveillance, environmental monitoring, respirators, recordkeeping, and training.

All of the cost estimates shown are calculated as the incremental costs required for compliance with the proposed cotton dust standards, at alternative dust exposure levels. It is assumed that the existing regulation limiting worker exposure to dust concentrations not in excess of 1.0 mg/m^3 (TWA) applies to yarn production and processing industries and that for these industries there is no incremental capital cost for engineering controls to comply with an exposure level of 1.0 mg/m^3 (TWA).

At the time this study was performed it was evident that not all firms were, in fact, in compliance with the existing regulation, although the actual level of controls operating in the cotton yarn industry could not be determined. In order to provide a reference point for the incremental costs presented in this report, the costs of going from zero dust control to compliance with the existing 1.0 mg/m^3 exposure standard was estimated at $143.3 million, in 1974 dollars. Other costs associated with additional requirements of the 1.0 mg/m^3 standard scenario, such as medical, posting, personal protective

equipment, employee information, work practices, and monitoring and recordkeeping are addressed and are shown in the appropriate sections.

There is some ambiguity regarding the application of the existing regulation to the other industries for which costs are shown. It is Department of Labor policy that no regulation will apply to an agricultural operation unless it is so stated explicitly in the regulations. Since cotton gins are not explicitly covered by the existing regulations, it is assumed that industry is not covered. It appears that the cotton waste processing industries and the cottonseed oil industry have not been required to comply with the existing regulations although it might be construed technically to apply to them. For this analysis, they were not assumed to be in compliance with the current standard.

Costs associated with compliance at the 0.5, 0.2 and 0.1 mg/m^3 (TWA) (TWA) are shown as the increments required for compliance at those exposure levels assuming compliance with the current regulations, where applicable.

a. *Yarn Production*

1) *Engineering Controls*

For engineering controls, capital costs include the purchase price of the control systems, labor and materials required for the installation of the control systems, and costs associated with building and utilities modification required for the installation of the control systems. Operation and maintenance costs include the labor and materials required for the day-to-day operation of the control system, including repair parts and filter replacement. Energy costs, expressed as kilowatt hours, are reported separately and reflect the incremental increase in energy consumption resulting from the operation of the control system and the increased load on existing air conditioning systems. Additional labor requirements (man-hours) to operate and maintain the control system are also pre-

sented. These cost elements are integrated in estimating annualized costs in the economic analysis of Chapter VI.

Engineering costs were initially computed on the basis of cost per cubic foot per minute (CMF) of air required to control dust generation from yarn production and processing equipment. These were then converted to a per machine basis, and subsequently to a cost per pound of raw cotton processed through the equipment. Data used in determining costs were obtained from control system vendors, textile plants in which control systems are in operation, and from data published by the R. S. Means Company pertaining to the costs of various types of construction. Table V-1 contains the basic cost data by equipment type for yarn mills. Details as to how these data were developed are presented in Appendix B.

Equipment inventory data were obtained from U.S. Bureau of Census publications. Equipment capacities and throughputs were obtained from various literature sources. A summary of these data is shown in Table V-2. Details as to how the data in Table V-2 were generated also appear in Appendix B.

In order to provide estimates of the cost of engineering controls for yarn manufacturing processes to achieve 0.1 mg/m^3 limits, it was necessary to extrapolate from the costs for less stringent controls. This procedure is valid as a means of providing a first estimate of cost because (a) the control techniques postulated to achieve the 0.1 mg/m^3 limit are essentially extensions of the techniques used for lesser control, i.e., ventilation and air filtration, and (b) the cost data for controls at 1.0, 0.5, and 0.2 mg/m^3, as well as RTI's experience with similar controls in other applications, indicates that there is a reasonably stable functional relationship between control cost and level of control. Mathematically, this calculation, for any machine type, is as follows:

$$\frac{\frac{Z-Y}{0.3}}{\frac{Y-X}{0.5}} = \frac{\frac{U-Z}{0.1}}{\frac{Z-Y}{0.3}},$$

where: X = control cost at the 1.0 mg/m³ limit,
Y = control cost at the 0.5 mg/m³ limit,
Z = control cost at the 0.2 mg/m³ limit, and
U = control cost at the 0.1 mg/m² limit.

Solving for U gives the expression:

$$U = \frac{5}{9} \cdot \frac{(Z-Y)^2}{Y-X} + Z.$$

The incremental control cost at the 0.1 mg/m³ limit, therefore, is U - X.

* * * * *

3) *Overall Industry Costs*

Industry-wide costs, initial and recurring, are shown in Table V-5. These costs are based on applying feasible controls on all cotton/yarn equipment regardless of type of fiber being processed. Exclusion of equipment processing man-made fibers only could reduce these costs by as much as 30 percent. Presumably, a mill processing synthetic fibers exclusively will not be subject to regulation under the proposed standard. It is not clear, on the other hand, just how the proposed standard will be applied in mills that process both cotton and synthetics. The equipment used in both processes is essentially the same and is convertible from cotton to synthetics and vice versa. The conservative estimate was made, therefore, that controls would be applied to all the production equipment in mills processing cotton and cotton-synthetic blends, even if part of their product is pure synthetic.

Costs per pound of raw cotton are shown in Table V-6; manpower requirements in Table V-7. Where a range of costs is presented, the lower figure reflects the cost of controlling equipment on which cotton or cotton blends is processed; the higher figure reflects the cost of controlling all yarn processing equipment regardless of fiber being processed.

* * * * *

2) *Weaving*

a) *Engineering Controls*

Cost estimates for engineering controls for yarn processing equipment in weaving mills were obtained by soliciting estimates from vendors of dust control equipment. Costs were estimated using the same analytical steps as described for the yarn production industry (See p. V-10).

Table V-9 gives the ventilation requirements to control the median dust concentrations to 0.5 and 0.2 mg/m^3 (V.E.), and gives the cost per machine, the annual maintenance and operating costs, and the annual energy consumption for dust control systems for the processes indicated. As indicated in Table V-9, no controls are estimated to be required in twisting, weaving and warping to achieve a median dust concentration of 0.5 mg/m^3 (V.E.).

* * * * *

Additionally, based on vendor data, it is estimated that dust control systems for winding and spooling would be required in only 20 percent of the installations to achieve 0.5 mg/m^3 (V.E.). These installations are those in which the yarn being processed was manufactured from very low quality cotton or which for some other reason have a greater than average dust problem. To estimate the cost per machine for dust control systems, the costs obtained from vendor data were multiplied by the estimated fraction of installations which would require dust control

Table V-5. Estimated Incremental Industry-Wide Initial and Recurring Costs to Achieve Permissible Exposure Limits: Yarn Production

Type of Equipment	Initial Costs [1] (Millions of Dollars)			Recurring Costs (Millions of Dollars)		
	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Control Equipment[2]	185.2	879.8	2510.1	3.7	10.1	16.2
Opening and Cleaning	(17.4)	(63.3)	(131.6)	(0.4)	(0.9)	1.4
Cards	(23.1)	(172.7)	(709.7)	(0.5)	(1.5)	2.7
Draw Frames	(7.1)	(39.9)	(124.9)	(0.1)	(0.4)	0.7
Combs	(-)	(7.6)	(10.1)	(-)	(0.1)	0.1
Roving	(38.3)	(100.0)	(155.3)	(0.3)	(1.0)	1.8
Spinning Frames	(99.3)	(496.3)	(1378.5)	(2.4)	(6.2)	9.5
Energy Costs[3]	-	-	-	18.5 [20.9]	61.5 [69.5]	134.3 [151.7]
Medical Surveillance	1.2	1.2	1.2	1.2	1.2	1.2
Environmental Monitoring	4.5	4.5	4.5	0.4	0.4	0.4
Posting	0.1	0.1	0.1	-	-	-
Respirator Program[4]	-	-		1.0	1.0	1.0
Total[3]	190.9 [215.7]	885.6 [999.8]	2515.8 [2841.2]	24.7 [27.7]	74.1 [82.8]	153.0 [174.1]

[1] Includes Capital Equipment costs, and one-time training and indoctrination costs.

[2] Controls required for all cotton systems equipment regardless of fiber processed.

[3] Costs shown in brackets [ ] are based on 1972 raw cotton consumption of 7,725 bales (480 lb/bale). These costs were entered into the Input-Output model in Chapter VI to be consistent with the constraints of that model. All other costs shown are based on 1973 raw cotton consumption, the latest data available.

[4] Costs during pre-compliance period, assuming zero control, pending installation of engineering controls. After engineering controls are operating, recurring costs are $910,000 for all proposed standards.

systems. Because of this, the cost figures appear quite low. This method of presenting costs was chosen to permit total industry costs to be obtained by multiplying the figures in the table by the total equipment in place. A similar discussion applies to the figures given for the 0.2 mg/m^3 exposure limit. In this case, based on vendor supplied data, controls are estimated to be required in 80 percent of all installations. Installations not requiring controls are those which process yarn made from very high quality cotton. Consequently, the fraction which requires dust control systems is much greater than for the 0.5 mg/m^3 limit. Data on the number of units of each piece of equipment now installed in the industry, shown in Table V-10, were obtained from [3] and [4].

Costs for weaving looms are based on engineering controls estimated to be applicable to the operation. For costing purposes, these consist of local exhaust ventilation systems over the area of the loom where the shuttle passes back and forth. It is estimated that a hood for this application would need to be aproximately two feet by five feet, based on an

* * * * *

estimated average loom width of 54 inches. It is further estimated that an air velocity of 200 feet per minute at the face of the hood would be needed to adequately capture the dust, which results in a requirement for 2,000 cfm per loom. The costs per cfm for application of hoods in such systems are estimated to be about the same as in the yarn production industry. The figure used for determining costs was $3.00 per cfm. Using this figure and an air requirement of 2,000 cfm along with the estimated 209,792 looms [4] processing cotton or blends of polyester and cotton, a total industry capital cost of $1,258.75 million is derived. Annual operating and maintenance costs are estimated at 3 percent of capital costs, or $37.76 million. Energy consumption is estimated at 12.5 Kwh/

Table V-11. Total Industry Costs For Engineering Controls (Weaving)

Equipment Type	0.5 mg/m^3				0.2 mg/m^3				0.1 mg/m^3			
	Capital ($\$10^6$)	Maintenance and Operations ($\$10^3$/yr)	Energy (10^6 Kwh/yr)	Labor (man-hrs/yr)	Capital ($\$10^6$)	Maintenance and Operations ($\$10^3$/yr)	Energy (10^6 Kwh/yr)	Labor (man-hrs/yr)	Capital ($\$10^6$)	Maintenance and Operations ($\$10^3$/yr)	Energy (10^6 Kwh/yr)	Labor (man-hrs/yr)
Winders	1.620	11.267	8.350	1,609	6.265	54.599	31.010	3,900	17,794	155.07	88.32	11,075
Spoolers	6.088	45.577	31.383	6,511	35.306	351.60	175.147	50,510	100.270	999.53	497.42	142,645
Twisters	----	----	----	----	47.464	433.36	237.320	61,908	134.798	1,231.60	673.99	175,819
Warpers	----	----	----	----	38.702	468.50	269.291	66,928	109.913	1,330.53	764.78	190,076
Looms	----	----	----	----	1,258.75	07,762.56	5,244.80	539,465	3,574.86	107,245.67	14,895.23	1,532,081

cfm/yr., which is the approximate average of systems in the yarn production industry at the 0.2 mg/m³ (V.E.) level. Cost estimates for the 0.1 mg/m³ (V.E.) level were obtained by assuming the increment over the costs of 0.2 is equal to that determined for the yarn production industry. The costs obtained for each level are given in Table V-11.

* * * * *

The Long-term Arrangement Regarding International Trade in Cotton Textiles (LTA) provided the vehicle for import quotas on cotton textiles and apparel and was of major importance for a number of years. The sharp rise of man-made fiber products in the late 1960's led to expanded trade agreements in 1971, and finally to the Multi-Fiber Arrangement Regarding International Trade in Textiles (MFA), which dealt with cotton, wool and man-made fiber products. These arrangements have tended to smother the effects of a small change in the relative prices of domestic versus foreign textile products [See Section 10 of Appendix C.I].

* * * * *

4) *Impact of OSHA Cost-Related Cotton Yarn Price Increases*

An important intermediate step in determining the final impact is to determine the impact upon plant profitability of the different exposure limits. This examination leads to other considerations such as industry-wide price increases resulting from control expenditures and the availability of labor force, energy and capital for investment in control equipment. Estimations of potential plant closures also resulted from this analysis. This analysis relies upon the assumption that the companies affected by the regulations will pass on fully their increased costs via price increases and thus escape the cost burden of the proposed OSHA regulation. However,

Table VI-5. Additional Installed and Annualized Compliance Costs Per Dollar of Sales

SIC	Exposure Limit mg/m^3	Value of Industry Shipments ($10^6)	Dollars/Dollar of Sales*				
			Installed Costs	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
2211		2660.6					
	0.5		.0419	.0067	.0014	.0041	.0122
	0.2		.1943	.0312	.0030	.0134	.0477
	0.1		.5525	.0888	.0046	.0291	.1225
2221		3856.3					
	0.5		.0099	.0016	.0003	.0010	.0029
	0.2		.0459	.0074	.0007	.0032	.0113
	0.1		.1305	.0210	.0011	.0069	.0289
2281		2250.6					
	0.5		.0241	.0039	.0008	.0023	.0070
	0.2		.1119	.0180	.0018	.0077	.0275
	0.1		.3181	.0511	.0026	.0168	.0705
2257		2808.8					
	0.5		.0012	.0002	.00004	.0001	.0004
	0.2		.0063	.0010	.00009	.0004	.0015
	0.1		.0188	.0030	.00013	.0008	.0040
2284		345.4					
	0.5		.0063	.0010	.0002	.0006	.0019
	0.2		.0328	.0053	.0005	.0022	.0079
	0.1		.0981	.0158	.0007	.0043	.0208
2296		685.1					
	0.5		.0032	.0005	.0001	.0003	.0009
	0.2		.0142	.0023	.0002	.0010	.0035
	0.1		.0392	.0063	.0003	.0022	.0088
TOTAL		12606.8					
	0.5		.0168	.0027	.0005	.0016	.0049
	0.2		.0781	.0126	.0012	.0054	.0192
	0.1		.2223	.0357	.0018	.0117	.0492

*Average compliance costs per dollar of sale are obtained by dividing the total compliance costs shown in Table VI-4a by value of shipments for each SIC sector.

Source: Costs and charges calculated based on Table VI-4a and Table C-2 of Appendix C.

they would face the contractions of demand for their products due to price increases.

In order to estimate the potential cotton yarn price increase, it is necessary to estimate the rates of return on investment, both before and after new exposure limits, for each of the six industry sectors. The level of return on investment after implementation and the relative change in this level from the pre-control level are the bases upon which determinations of adverse economic impact have been made. It is assumed that firms in these industries will attempt to maintain the pre-compliance rate of return on investment, and the average price level in the six industries would increase sufficiently to maintain the pre-compliance rate of return on investment. Two approaches other than the rate of return approach used here may appear reasonable: (1) raising output prices in the same proportion as costs increase (a simple cost pass-through approach) or, (2) increasing output prices after compliance to the level required to maintain earnings per share of common stock (earnings per share approach). However, the rate of return approach is preferred over the simple cost pass-through approach because, as will be shown later, the latter under estimates the compliance cost-related output price increases. As for the earnings per share approach, data problems are often prohibitive. For example, it could not be assumed that firms in these industries would attempt to maintain profits per share of common stock, since adequate data were not available on privately owned small firms.

* * * * *

Table VI-8 summarizes the estimated change in profitability, measured in dollars per dollar of industry shipments, as a result of incurring three different levels of exposure limit compliance costs. The first row of Table VI-8 shows the pre-implementation profitability levels, which are assumed to be applicable to all six textile in-

Table VI-8. Financial Impact of OSHA Cotton Dust Exposure Limits
($/Dollar of Sale)

SIC	Exposure Limit mg/m^3	Total Assets	Total Cost	Profit After Tax	Rate of Return to Investment (ROI)	Price Increase Required to Maintain Pre-Control ROI
Precontrol	1.0	0.612	0.954	0.025	0.041	
2211	0.5	0.654	0.966	0.0184	0.028	0.0155
	0.2	0.806	1.002	-0.0009	-0.001	0.0625
	0.1	1.165	1.077	-0.042	-0.036	0.1644
2221	0.5	0.622	0.957	0.0234	0.038	0.0038
	0.2	0.658	0.965	0.0189	0.029	0.0149
	0.1	0.742	0.983	0.0093	0.012	0.0389
2281	0.5	0.636	0.961	0.0212	0.033	0.0090
	0.2	0.724	0.981	0.0101	0.014	0.0361
	0.1	0.930	1.025	-0.0133	-0.014	0.0947
2257	0.5	0.613	0.954	0.0248	0.040	0.0006
	0.2	0.618	0.956	0.0242	0.039	0.0022
	0.1	0.631	0.958	0.0228	0.036	0.0056
2284	0.5	0.618	0.956	0.0240	0.039	0.0025
	0.2	0.645	0.962	0.0207	0.032	0.0106
	0.1	0.710	0.975	0.0137	0.019	0.0283
2296	0.5	0.615	0.955	0.0245	0.040	0.0013
	0.2	0.626	0.958	0.0231	0.037	0.0048
	0.1	0.651	0.963	0.0202	0.031	0.0119

Sources: Calculations are based on data in Tables VI-5 and VI-7a.

dustry sectors. In order to determine the change in profitability resulting from the estimated control costs, the installed cost requirements per dollar of sales (TIC) for each of these sectors are added to the pre-control total asset (PRAS), 61.2 cents, and total annualized costs (TAC) are added to the pre-control total costs (PRTC), 95.4 cents. From these increased values, total assets and total costs, the post-standard returns on investment are calculated and shown in Table VI-8 (ROI column) for each of the six sectors for three exposure limits. The last column of Table VI-8 shows the average price increase per dollar of sales (PINC) required to maintain pre-control rate of returns on investment, (PRROI). The above calculation can be summarized as follows:

Since by definition,

$$\text{Rate of Return} = \frac{(\text{Price-Cost}) \times (1-\text{tax Rate})}{\text{Assets}} = \frac{\text{Net Profit}}{\text{Assets}} \qquad (1)$$

one may write

$$\text{PRROI} = \frac{[(P + \text{PINC}) - (\text{PRTC} + \text{TAC})] \times (1 - \text{Tax Rate})}{\text{PRAS} + \text{TIC}}, \qquad (2)$$

or

$$\text{PINC} = \frac{\text{PRROI}\,(\text{PRAS} + \text{TIC})}{(1 - \text{Tax Rate})} + (\text{PRTC} + \text{TAC}) - P. \qquad (3)$$

where P is pre-control output price. P is unity for the computations in Table VI-8 and P equals the average price of cotton yarn ($/1b) shown at the third column of Table VI-9 for the computations in Table VI-9.

The price increases required for SIC Code 2211 (Weaving Mills, Cotton) are 1.6, 6.3 and 16.4 cents per dollar of sales for the 0.5, 0.2 and 0.1 mg/m^3 exposure limits, respectively. Similarly, 0.9, 3.6 and 9.5 cents in price increases are required for SIC Code 2281 (Yarn Mills, Except Wool). SIC Code 2221 (Weaving Mills, Manmade Fiber and Silk) requires 0.4 cents, 1.5 cents and 3.9 cents to maintain pre-control rates of return, while SIC

Table VI-9. Financial Impact of OSHA Cotton Dust Exposure Limits
($/Pound of Cotton Yarn Produced)

SIC	Exposure Limit mg/m^3	Total Assets	Average Price of Cotton Yarn ($/lb.)	Total Cost	Profit After Tax	Rate of Return to Investment (ROI)	Price Increase Required to Maintain Pre-Control ROI ($/lb.)	Percent of Increase
2211	0.5	0.775	1.176	1.138	.0207	.0267	.020	1.7
	0.2	0.975	1.176	1.185	-.0046	-.0047	.082	7.0
	0.1	1.445	1.176	1.283	-.0580	-.0401	.216	18.3
2221	0.5	0.775	1.176	1.138	.0207	.0267	.020	1.7
	0.2	0.975	1.176	1.185	-.0046	-.0047	.082	7.0
	0.1	1.445	1.176	1.283	-.0580	-.0267	.216	18.3
2281	0.5	0.775	1.176	1.138	.0207	-.0267	.020	1.7
	0.2	0.975	1.176	1.185	-.0046	-.0047	.082	7.0
	0.1	1.445	1.176	1.283	-.0580	-.0401	.216	18.3
2257	0.5	0.972	1.483	1.434	.0267	.0274	.024	1.6
	0.2	1.242	1.483	1.495	-.0068	-.0054	.106	7.2
	0.1	1.908	1.483	1.626	-.0778	-.0408	.287	19.4
2284	0.5	0.972	1.483	1.434	.0267	.0274	.024	1.6
	0.2	1.242	1.483	1.495	-.0068	-.0054	.106	7.2
	0.1	1.908	1.483	1.626	-.0778	-.0408	.287	19.4
2296	0.5	0.679	1.023	0.991	.0173	.0255	.019	1.9
	0.2	0.863	1.023	1.035	-.0064	-.0074	.077	7.5
	0.1	1.281	1.023	1.123	-.0545	-.0425	.197	19.2

Sources: Calculations are based on data in Tables VI-3 and VI-7a.

Code 2296 (Tire Cord and Fabric) requires the lowest price increases, 0.1 cents, 0.5 cents and 1.2 cents per dollar of sales, to comply with the 0.5, 0.2 and 0.1 mg/m^3 exposure limits, respectively, and to maintain the pre-control rate of return. It is important to note that the price increases per dollar of sales shown in Table VI-8 are higher than the total annualized costs (per dollar of sales) shown in Table VI-5 for all three exposure limits for all six of the SIC sectors. As mentioned previously, this is why the rate of return approach is preferred to the simple cost pass-through approach which assumes the price increases per dollar of sales equals the total annualized cost per dollar of sales. Moreover, it is important to note that price increases required to maintain pre-control ROI for the 0.1 mg/m^3 exposure limit are 200 - 300 percent of those required at the 0.2 mg/m^3 exposure limit and 900 - 1000 percent of those required by the 0.5 mg/m^3 exposure limit. Additionally, in the absence of price increases, profit-after-taxes and ROI would be very small or negative in some cases.

Table VI-9 represents similar computations as above, but they are estimated per pound of cotton yarn produced. The average prices of cotton yarn produced in each sector are estimated on the basis of the observation that SIC Codes 2257 and 2284 typically produce and consume a higher quality of yarn than the other sectors and SIC Code 2296 consumes a lower quality of yarn. SIC Codes 2211 and 2221 are assumed to produce and consume a combination of several qualities of yarn, similar to that produced by SIC Code 2281.

Table VI-9 indicates, for example, that for SIC Codes 2211, 2221, and 2281, 2.0, 8.2 and 21.6 cents are required per pound of cotton yarn produced to maintain the pre-control return on investment after exposure limits of 0.5, 0.2, and 0.1 mg/m^3 are imposed. SIC Codes 2257 and 2284 require 2.4, 10.6 and 28.7 cents per pound of

yarn to maintain pre-control rates of return and to satisfy the three exposure limits. SIC Code 2296 requires 1.9, 7.7 and 19.7 cents. In this computation, the production losses in yarn spinning were ignored. It is worth noting that all the sectors had negative "profits after taxes" for 0.2 and 0.1 mg/m^3 exposure limits, if no price increases are assumed.

To clarify the manner by which the figures in Tables VI-8 and VI-9 were generated from previous tables, the calculations for the 0.2 mg/m^3 exposure limit for SIC Code 2211 are detailed in the following example. Applying compliance cost data (per dollar of sales) from Table VI-5 and pre-control financial parameters shown at the first column of Table VI-7a and at the first row of Table VI-8 to the equation (2) in this section results in:

$$0.041 = \frac{[(1 + \text{PINC}) - (0.954 + 0.0477)] \times (1 - 0.4565)}{0.612 + 0.1943}$$

where the Tax Rate $= \dfrac{\text{Income Tax}}{\text{Profit Before Taxes}} = \dfrac{0.021}{0.046} =$ 0.4565, from Table VI-7a and P is set equal to 1. Solving this equation results in PINC = 0.0625 (which is shown in the last column of Table VI-8).

To obtain the figures in Table VI-9, P is set equal to 1.176 for SIC Code 2211 and PRTC and PRAS in equation (2) are multiplied by 1.176. The value of TAC and TIC were taken from Table VI-3 as below:

$$0.041 = \frac{[(1.176 + \text{PINC}) - (0.954 \times 1.176 + 0.0626)] \times (1 - 0.4565)}{0.612 \times 1.176 + 0.255}$$

or

PINC = 0.082 which is shown in the 7th column of Table VI-9. The last column of Table VI-9 is obtained by $\dfrac{0.082}{1.176} \times 100$.

Equation (2) holds only when one assumes the price demand elasticity for the sector's output, i.e. cotton yarn, is zero. One important point to note here is that the prime demand elasticity is for the derived input demand (as opposed to consumer demand) because the outputs of the sector, i.e., cotton yarns, are used as inputs to other producing sectors. As is well known (from Marshall) the derived input demand elasticities depend upon four different factors: elasticity of input substitution; supply elasticity of inputs; share of that input cost in total production cost; and output demand elasticities for the products which are produced using these inputs. The deailed data on these factors are not available and to estimate the accurate derived demand elasticity is beyond the scope of this study. Therefore, it was decided to adopt an extreme assumption of zero price demand elasticity in computing the post-control price increases. However, it is of great interest to investigate how much bias the estimated results will have due to the assumption of zero price elasticity of demand when the real elasticity is actually non-zero. More accurately, equation (2) can be rewritten as:

$$\text{PROI} = \left[\frac{(P + \text{PINC}) \times (1 - \eta \cdot \text{PINC}) \times \text{PRVL}}{(\text{PRAS} + \text{TIC}) \times \text{PRVL}} - \frac{[\text{PRTC} \times .90 \times (1 - \eta \cdot \text{PINC}) \times \text{PRVL} + \text{PRTC} \times .1 \times \text{PRVL} + \text{TAC} \times \text{PRVL}]}{(\text{PRAS} + \text{TIC}) \times \text{PRVL}} \right] \times (1 - \text{Tax Rate}) \quad (4)$$

where η is the price elasticity of demand for the output of the sector, and PRVL is the pre-control total value of industry shipments.

The basic ideas in equation (4) are that the revenue will be increased by the price increases (P + PINC) but

decreased by the reduction of demand ($1 - \eta$. PINC), and that while total industry variable costs will be reduced by the demand contraction, total industry fixed costs and total industry assets will not be influenced by the demand contraction. It is assumed that 90 percent of the pre-control total costs (PRTC) are variable costs, i.e., 55 percent material costs, 30 percent labor costs and 5 percent other sales costs, and that all of total annualized costs (TAC) are fixed costs. When the demand elasticity, η, is zero equation (4) becomes equation (2). Again, using the value for the 0.2 mg/m^3 exposure limit for SIC Code 2211, the figures corresponding to those in Table VI-8 can be computed for any desired elasticity scenario, such as $\eta = 0.5$ and $\eta = 1.0$. When $\eta = 0.5$,

$$0.041 = \left[\frac{(1 + \text{PINC}) \times (1 - 0.5 \times \text{PINC}) \times 2660.6}{(0.612 + 0.1943) \times 2660.6}\right.$$

$$\left. - \frac{[0.954 \times 0.9 \times (1 - 0.5 \times \text{PINC}) \times 2660.6 + 0.954 \times 0.1 \times 2660.6 + 0.0477 \times 2660.6]}{(0.612 + 0.1943) \times 2660.6}\right]$$

$$\times (1 - 0.4565)$$

or

$$(\text{PINC})^2 - 1.8586 \times \text{PINC} + 0.125 = 0$$

One solution for PINC is 0.07. This implies that if one adopts the assumption of zero demand elasticity when the true demand elasticity is 0.5, the estimated post-control price increase, per dollar of sales, 0.0625 underestimates the real price increase per dollar sales, 0.07, by approximately 10 percent.

Similarly, when $\eta = 1.0$, $(\text{PINC})^2 - 0.8586 \times \text{PINC} + 0.0625 = 0$. The solution for PINC is 0.08, which implies that when the true elasticity is unity, the esti-

mated price increase based on the zero demand elasticity will underestimate the true value by approximately 22 percent.

The above computation indicates that unless the true demand elasticity for the output of the given sector is substantially greater than unity, our impact analysis based on the assumption of zero price elasticity of demand would not be invalidated.

d. *Impact on Market Structure and Marginal Industries*

Even in the extreme case where no significant adverse impact, as measured by profitability, appears to accrue to the industry due to the new limits (assuming that costs are passed on), it is possible that capital availability could be a problem for this industry. Most economic studies of the impact of control standards have considered only the capital cost of new equipment and the operating and maintenance costs of those devices. Largely ignored are the capital fund and capacity shortages resulting from these costs and the impact these shortages have on both national and regional economic growth. The outlay of funds for standard compliance capital will reduce the cash available for plant and equipment expenditures such as for replacement of obsolete equipment and for expansion to desired levels of production capacity.

As noted in Appendix C, which describes the industry economic environment, the capacity utilization rate has been considerably lower for the textile industry than for many other industrial sectors. Therefore, the production capacity shortages due to the compliance capital requirements are not likely to be severe for this industry. However, as noted in a previous section, the major impact of the proposed cotton dust exposure limits

for this industry will come from the additional capital requirements rather than from the production cost increases due to the annualized compliance costs. The actual impact will depend in part upon how the capital costs are financed (long-term debt or equity) and the length of time over which the compliance investment is spread. The shorter the period over which the investment is spread (i.e., the heavier the annual purchase of compliance equipment are), the larger the potential impact upon the capital fund market and interest rates. Heavy short-term investments in compliance expenditures would cause the external capital funds available to companies to become relatively more scarce and, in turn, interest rate companies would have to pay on such funds would increase.

Since the textile industry is composed of a heterogeneous group of companies, it is not very meaningful to discuss whether or not the capital requirement of 2802.7 million dollars for the 0.1 mg/m^3 exposure limit, for example, can be financed at the industry level. As shown in Table VI-10, the financial strength indicated by the rates of "profit after tax" or "return on investment" varies significantly among the different size classes of textile companies; the rate of "profit after tax" varies directly with the size class of companies, ranging from losses for many of the smaller firms to about 4.6 cents per dollar of sales for those in the largest class. Therefore, it is important to consider the potential financing problems arising from the capital requirements of the proposed OSHA exposure limits at the company level, and as will be discussed shortly, the ability to finance the compliance capital requirement will be used as a major decision rule in predicting possible plant closures. The engineering information obtained by RTI revealed that there is no significant variation in the compliance capital costs and annualized costs per unit of output among different size classes of textile mills (control de-

Table VI-10. Comparison of Basic Financial Parameters Among Different Size Classes of Textile Companies (Unit = $/Dollar of Sales)*

Annual Sales	Total Assets	Total Costs	Profit Before Taxes	Profit After Taxes	Rate of Return to Investment
Average, All Companies	0.612	0.954	0.046	0.025	0.041
Under $25,000	10.780	2.148	-1.148	-1.199	-0.111
$ 25,000 – $ 50,000	0.733	1.017	-0.017	-0.0192	-0.026
50,000 – 100,000	0.638	1.030	-0.030	-0.036	-0.057
100,000 – 500,000	0.534	0.988	0.012	0.004	0.009
500,000 – 1,000,000	0.439	0.976	0.024	0.015	0.034
1,000,000 – 5,000,000	0.465	0.965	0.035	0.019	0.040
5,000,000 – 10,000,000	0.478	0.961	0.039	0.020	0.042
10,000,000 – 50,000,000	0.540	0.954	0.046	0.025	0.046
50,000,000 – 100,000,000	0.691	0.949	0.051	0.028	0.040
100,000,000 – 250,000,000	0.765	0.949	0.051	0.028	0.037
250,000,000 – 500,000,000	0.936	0.934	0.066	0.038	0.040
500,000,000 – 1,000,000,000	0.622	0.954	0.046	0.026	0.042
Over $1,000,000,000	0.715	0.916	0.084	0.046	0.065

*The financial parameters by size class of firms were obtained by averaging data for the 5 year period 1965-66 and 1968-70 and by subsequently inflating those results to 1974 levels. This inflation was accomplished by taking financial parameter data for the total industry between 1970 and 1974 and applying the resulting ratio to all size classes.

Source: Internal Revenue Service, Corporation Income Tax Returns

vices are applied to each piece of equipment and there are no significant economies of scale). Therefore, substantial differences are not expected in relative changes of post-control profitability from pre-control ones due to different production cost increases among the different size classes of companies.

The ratio of capital requirements to profit after taxes is used in this study as a measure of the ability of each class of textile company to finance the compliance capital costs. If the ratio is substantially larger for a size class than those for most other size classes, then those companies belonging to this size class are likely to have capital shortage problems and probably will be forced to rely heavily on external debt financing, and thus pay higher capital costs. Therefore, rates of return to investment for these companies will be further depressed.

One realistic and convincing theory of investment is that the level of investment expenditures is proportional to profits[7]. Two alternative rationalizations of this theory can be offered. First, realized profits measure expected future profits and so it is almost a tautology to say that investment is governed by profits expectations. Second, the rate of investment may be constrained by the supply of funds. In reality, some kind of financial constraints operate at all times; the cost of funds schedule becomes highly inelastic when internal funds are exhausted. The cash available for investment, which is the source for internal financing, is usually measured by the sum of retained earnings and depreciation allowances. However, there is a strong recent claim by corporate finance analysts that the depreciation on plant and equipment, which are subtracted from gross profits before computing corporate tax bills, cannot begin to cover the cost of replacing production capacity[8]. This underdepreciation is largely due to the fact that such production capacity will be very expensive to replace because

of recent high inflation and that depreciation allowances are based on original purchase costs.

The above discussion implies that the cash available for both capacity expansion investment and nonproductive capital investment such as capital costs for compliance with the standard should come from the retained earnings. Therefore, the profit after tax should be a good measure for the flow of internal funds available for investment, remembering that the average share of retained earnings out of profit after taxes has remained stable over time for the textile industry. The above analysis indicates that as the ratio of compliance capital costs to profits after taxes is larger, the company is likely to face more severe difficulty in financing the compliance capital. First, because the smaller profit after taxes predict the poor expected future profits, and second, because the smaller profit after taxes indicates the smaller flow of internal funds available for investment.

Table VI-11 presents the ratio of capital costs for compliance to profit after taxes for each size class of company within each of the six SIC sectors and for three exposure limits based on the financial data by company size presented in Table VI-10. The profits after taxes are calculated assuming that prices of industry outputs have been raised enough to maintain pre-control return on investment as shown in Table VI-8. It seems clear from Table VI-11 that the greatest difficulties in financing capital costs for compliance will fall on the two sectors, SIC Code 2211 (Weaving Mills, Cotton) and SIC Code 2281 (Yarn Mills, Except Wool). The exposure limit of 0.1 mg/m^3 will require compliance capital expenditures in excess of 700 percent of annual profits after taxes for all the size classes of companies in SIC Code 2211 and in excess of 500 percent of profit after taxes for all the size classes of companies in SIC Code 2281. The exposure limit of 0.2 mg/m^2 will require compliance capital expenditures in excess of 300 percent of

annual profit after taxes for all the size classes of companies in SIC Code 2211 and substantial expenditures in SIC Code 2281 as well. However, the limit of 0.5 mg/m^3 reveals significantly smaller ratios for all sectors except some smaller size classes in SIC Code 2211, and the ratios are less than unity for this exposure limit for all size classes of firms in each of the six SIC sectors, except SIC Codes 2211 and 2281, and for the medium to small classes of SIC Code 2221 and 2284.

The ratios for the 0.1 mg/m^3 exposure limit are extremely large for SIC Codes 2211 and 2281, ranging from 7.95 (compliance capital costs equal to 795 percent of profits after taxes) to 28.96 for SIC 2211, ignoring three smallest size classes for which pre-control profits were negative. The comparable range for SIC 2281 is from 5.32 to 24.81. For the 0.1 mg/m^3 exposure limit, even SIC Codes 2221 and 2284 reveal large ratios ranging from 2.51 to 16.73 for SIC Code 2221 and from 1.94 to 14.19 for SIC Code 2284.

The ratios for the 0.2 mg/m^3 exposure limit are also large for SIC Codes 2211 and 2281, ranging from 3.56 to 20.46 for SIC 2211. The comparable range for SIC 2281 is from 2.19 to 15.32, and for SIC Code 2221 the range is 0.95 to 8.29. The ratio for this exposure limit exceeds unity for all but the largest size class in SIC Codes 2221 and 2284, and is below unity for nearly all size classes in SIC Codes 2257 and 2296. In all cases, ignoring negative profits (for which the conclusion is clear), the ratios generally decline as company size increases, i.e. the ratios are larger for small size classes than for larger size classes. Also, the differences in the size of ratios between classes is quite pronounced, suggesting that the difficulty of financing the compliance capital costs within a given SIC sector is inversely related to size of firm. These observations are true for each of the 0.5 mg/m^3, 0.2 mg/m^3 and 0.1 mg/m^3 limits, but the impact is much more pronounced at 0.1 mg/m^3 level.

Table VI-11. Ratios of Compliance Capital Costs to Profit After Tax, by SIC and Exposure Level*

Annual Sales	SIC 2211			SIC 2221			SIC 2281		
	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Average, All Companies	1.56	5.88	11.57	0.39	1.70	4.29	0.92	3.77	8.34
Under $25,000	-0.04	- 0.16	- 0.48	-0.01	-0.04	- 0.11	-0.02	- 0.09	-0.27
$ 25,000 - $ 50,000	-2.71	-79.15	19.61	-0.54	-3.04	-16.56	-1.42	-11.82	38.92
50,000 - 100,000	-1.30	-10.63	37.82	-0.28	-1.44	- 5.41	-0.71	- 4.34	-46.29
100,000 - 500,000	7.72	20.46	28.96	2.16	8.29	16.73	4.85	15.32	24.81
500,000 - 1,000,000	2.46	8.05	13.54	0.64	2.66	6.16	1.48	5.51	10.63
1,000,000 - 5,000,000	2.03	7.24	13.29	0.51	2.21	5.39	1.21	4.77	9.96
5,000,000 - 10,000,000	1.92	7.00	13.26	0.48	2.09	5.16	1.14	4.55	9.76
10,000,000 - 50,000,000	1.57	5.92	11.67	0.39	1.71	4.31	0.93	3.79	8.40
50,000,000 - 100,000,000	1.42	5.45	10.96	0.35	1.55	3.95	0.84	3.46	7.80
100,000,000 - 250,000,000	1.40	5.34	10.75	0.35	1.52	3.87	0.82	3.40	7.65
250,000,000 - 500,000,000	1.06	4.23	9.02	0.26	1.16	3.02	0.62	2.64	6.21
500,000,000 - 1,000,000,000	1.50	5.64	11.08	0.37	1.63	4.11	0.89	3.62	7.99
Over $1,000,000,000	0.87	3.56	7.95	0.21	0.95	2.51	0.51	2.19	5.32

Annual Sales	SIC 2257			SIC 2284			SIC 2296		
	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Average, All Companies	0.05	0.25	0.73	0.25	1.24	3.37	0.13	0.55	1.47
Under $25,000	-0.001	-0.01	-0.02	-0.01	-0.03	-0.08	-0.003	-0.01	-0.03
$ 25,000 - $ 50,000	-0.06	-0.34	-1.08	-0.34	-2.03	-9.16	-0.17	-0.80	-2.50
50,000 - 100,000	0.03	-0.18	-0.55	-0.18	-1.00	-3.61	-0.09	-0.41	-1.21
100,000 - 500,000	0.28	1.40	3.89	1.41	6.29	14.19	0.73	3.01	7.31
500,000 - 1,000,000	0.08	0.41	1.17	0.41	1.97	5.00	0.21	0.90	2.32
1,000,000 - 5,000,000	0.06	0.33	0.96	0.33	1.62	4.29	0.17	0.73	1.91
5,000,000 - 10,000,000	0.06	0.31	0.90	0.31	1.52	4.09	0.16	0.68	1.80
10,000,000 - 50,000,000	0.05	0.25	0.73	0.25	1.24	3.39	0.13	0.55	1.48
50,000,000 - 100,000,000	0.04	0.23	0.66	0.23	1.13	3.09	0.11	0.50	1.34
100,000,000 - 250,000,000	0.04	0.22	0.65	0.22	1.10	3.03	0.11	0.49	1.31
250,000,000 - 500,000,000	0.03	0.17	0.49	0.17	0.84	2.35	0.08	0.37	1.00
500,000,000 - 1,000,000,000	0.05	0.24	0.70	0.24	1.19	3.24	0.12	0.53	1.41
Over $1,000,000,000	0.03	0.13	0.40	0.13	0.68	1.94	0.07	0.30	.81

*The negative ratios for the three smallest size classes are due to the negative value of pre-control profit after tax as shown in Table VI-10.
Sources: Tables VI-8 and VI-10.

The evidence presented in Table VI-11 clearly indicates that unless the compliance capital investments are spread over a substantial number of years, all the companies engaged heavily in cotton yarn production will face severe difficulty in financing compliance capital for the 0.2 mg/m^3 and 0.1 mg/m^3 exposure limits and the difficulty will be more intense for smaller companies. However, the above analysis only points out the relative difficulties among size classes of companies and industry sectors. It fails to identify specifically which plants are likely to be closed due to compliance capital requirements. It is impossible to state with any certainty that a certain plant might close as a result of the exposure limits. It can only be recognized that the possibility of closure does exist, due to the difficulty in financing capital costs for the 0.2 mg/m^3 and 0.1 mg/m^3 exposure limits.

Two sectors, SIC Code 2211 (Weaving Mills, Cotton) and SIC Code 2281 (Yarn Mills, Except Wool), in particular, and to some degree SIC Code 2221 (Weaving Mills, Manmade Fiber and Silk), will have severe problems in acquiring compliance capital necessary to meet the 0.2 mg/m^3 and 0.1 mg/m^3 exposure limits.

Appendix D presents some estimates of financial impacts of OSHA exposure limits for each of 35 publicly-owned major textile companies. However, it should be noted that financial impacts of OSHA exposure limits for these major producers are likely to be substantially different from the minor producers.

Since Table VI-11 clearly indicates that the difficulty of financing the compliance capital costs within a given SIC sector is inversely related to size of firm, the distribution of companies, plants and sales within the major SIC sectors by size of annual sales is presented in Table VI-12. However, it should be hastily pointed out that the information contained in Table VI-12 cannot be

directly linked to Tables VI-10 and VI-11 because while the latter tables are classified by the total annual sales of each company including products which do not belong to the six SIC codes studied, the former table is exclusively classified by annual sales belonging to the SIC sector designated in the column heading. Therefore, any company classified in, for example, the 5-10 million dollar (of SIC 2211) annual sales classification in Table VI-12 should have financial parameters of the annual sales class greater than 5-10 million dollars in Table VI-10, unless that company produces only SIC 2211 products and nothing else.

Thus the information in Table VI-12 should be used with appropriate caution. For example, if some other source of information suggested that all the companies producing SIC Code 2211 products in the less than 5 million dollars (annually) classification would be forced to close their plants due to the compliance capital costs, Table VI-12 indicates that the number of companies in SIC Code 2211 will decrease to less than one-half of the current total number of companies (from 182 to 79 companies) and the production capacity of SIC 2211 will be reduced by 6.4 percent (assuming capacity utilization rates are uniform among different size classes of companies). Furthermore, if all the companies producing less than $10 million of SIC 2211 products annually are forced to close due to the compliance capital requirement, the total number of companies will be reduced from 182 to 45 and production capacity will be reduced by 14.3 percent of the current level of capacity.

* * * *

f. *Employment Impact*

1) *Output Demand Elasticity*

The hypothesized exposure limits may have either one of two effects on producers of cotton yarn and cotton

fabric. First, managers of marginal plants may choose to close their facilities rather than bear the cost of meeting the new cotton dust exposure limits. Second, those plants which remain open, as well as any new entrants into these industries, will incur higher costs, which in turn will necessitate charging higher unit prices to insure continued profitable operations. Quantity demanded will be less at the new higher prices and the industry(s) will contract. The magnitudes of these price increases and the quantity contractions will depend upon the price elasticity of demand and the price elasticity of supply for the products of the industry(s). In the short run, the closing of productive capacity could reduce supply below the new and lower level of supply and demand equilibrium causing a temporary upward pressure on prices, rising above the long-run equilibrium level. Such pressure is not, in all probability, to be expected in the cotton textile industries since these industries have typically experienced excess capacity, and the closing of marginal firms would not reduce the quantity supplied below the equilibrium level. In the absence of excess capacity, new investment would soon absorb, in any event, any excess profit caused by temporary price aberrations. The question remains as to how the market would react.

In order to predict the cotton consumers' responses to price increases, reasonable estimates of price elasticities of demand are necessary for each of the 477 PCE items so that estimates can be made of the previously discussed contraction in demand and the subsequent reduction of production and employment in the cotton yarn producing industries.
used since long-run elasticities were not available except

Direct price elasticities of demand were obtained from *An Investigation of Consumer Demand Elasticities* by Ernst and Ernst[10]. Only the short run elasticities were

for a few industries, and short-run elasticities were available by SIC Code products for the year 1972. When necessary, the estimates of price demand elasticities for PCE groups made by Houthakker and Taylor[11] were also utilized. Estimates of price demand elasticities for the 25 major cotton consuming PCE items are listed in Table VI-14a.

2) *The Contraction of Cotton Yarn Production*

In order to obtain the percentage contraction of demand for each of the 477 PCE items, the price elasticities of demand matched to each of the 477 PCE items were then multiplied by the estimates of percent price increases for each PCE item obtained by the second approach in Section e. Table VI-14b presents estimated declines in final demand for the 25 major cotton consuming PCE items.

Table VI-14b indicates that for the 0.1 mg/m^3 limit the most significant declines in final demand will occur in Men's and Boy's Gloves (43.8%), Tents and Other Canvas Products (22.3%), Thread Mills (11.9%), and Awnings and Tarpaulins (11.0%). The 0.2 mg/m^3 exposure limit results in smaller declines in final demand than does the 0.1 mg/m^3 limit, i.e., the decline in final demand due to the 0.2 mg/m^3 limit is approximately one-third of that due to the 0.1 mg/m^3 limit. Again, declines in final demand due to the 0.5 mg/m^3 limit are relatively insignificant and are approximately one-fourth of those due to the 0.2 mg/m^3 exposure limit.

While the two largest cotton consuming PCE items, Men's and Boy's Apparel (0.4, 1.6 and 4.3 percent declines at the three exposure limits) and Home Furnishings (0.3, 1.3 and 3.5 percent), reveal significant declines in demand, Women's and Children's Apparel (0.04, 0.16 and 0.41 percent) reveal only a minor slackening in final demand.

Table VI-14a. Estimates of Short Run Demand Price Elasticities for 25 Major PCE Items.

PCE Serial Number	PCE Code Number	PCE Item Description	1967 Cotton Consumption (10^6 lbs.)	1967 PCE Expenditures ($\$10^6$)	Estimates of Short Run Price Elasticities
97	20302	Men's and Boys' Apparel	1251.90	9721.9	-2.11
228	50500	Home Furnishings	919.15	2506.1	-0.60
76	20301	Women's and Childrens' Apparel	747.48	15993.5	-0.55
222	50500	Broadwoven Fabric	315.19	422.4	-0.20
176	50400	Carpets and Rugs	95.86	2340.7	-0.30
105	20400	Military Clothing	73.98	124.3	-0.20
99	20302	Men's and Boys' Clothing	62.30	102.0	-4.50
95	20302	Men's and Boys' Hose	60.47	507.4	-1.50
412	90400	Tents and Other Canvas Products	56.42	96.6	-2.40
344	80101	New Passenger Cars	53.09	17972.5	-2.50
227	50500	Curtains and Draperies	45.42	730.7	-0.40
179	50400	Awnings and Tarpaulins	42.41	42.9	-0.70
63	20100	Footwear	39.88	4534.6	-0.19
324	60600	Hospital Services	38.85	9717.0	-0.27
78	20301	Diapers	38.10	166.0	-0.50
175	50400	Blankets	37.70	252.4	-0.20
68	20301	Broadwoven Fabric	36.90	389.8	-0.20
141	50100	Mattresses and Bedsprings	33.39	1120.7	-0.90
60	20100	Rubber Footwear	31.38	693.4	-1.00
264	50600	Abrasive Products	23.67	100.4	-0.47
178	50400	Pillows, Comforters, and Quilts	23.64	198.8	-0.60
73	20301	Hosiery	20.92	1087.6	-1.50
387	90100	Book Publishing	18.21	1681.8	-0.80
223	50500	Thread Mills	16.74	12.9	-0.50
106	20400	Military Accessories	10.06	48.5	-0.50

Source: Ernst and Ernst [10] and Houthakker and Taylor [11].

Table VI-14b. Estimated Declines of Final Demand Due to OSHA Cotton Dust Exposure Limits for PCE Sectors.

PCE Serial Number	PCE Code Number	PCE Item Description	1967 Cotton Consumption (10^6 lbs.)	Percentage Decline of Final Demand Due to OSHA Standards*		
				0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
97	20302	Men's and Boys' Apparel	1251.90	0.40	1.64	4.32
228	50500	Home Furnishings	919.15	0.32	1.33	3.49
76	20301	Women's and Children's Apparel	747.48	0.04	0.16	0.41
222	50500	Broadwoven Fabric	315.19	0.22	0.90	2.37
176	50400	Carpets and Rugs	95.86	0.02	0.07	0.20
105	20400	Military Clothing	73.93	0.17	0.72	1.89
99	20302	Men's and Boys' Gloves	62.30	4.04	16.62	43.77
95	20302	Men's and Boys' Hose	60.47	0.26	1.08	2.84
412	90400	Tents and Other Canvas Products	56.42	2.06	8.45	22.25
344	80101	New Passenger Cars	53.09	0.01	0.04	0.12
227	50500	Curtains and Draperies	45.42	0.04	0.15	0.39
179	50400	Awnings and Tarpaulins	42.41	1.02	4.17	10.99
63	20100	Footwear	39.88	0.002	0.01	0.03
324	60600	Hospital Services	38.85	0.002	0.006	0.02
78	20301	Diapers	38.10	0.17	0.69	1.82
175	50400	Blankets	37.70	0.04	0.18	0.47
68	20301	Broadwoven Fabric	36.90	0.03	0.11	0.30
141	50100	Mattresses and Bedsprings	33.39	0.04	0.16	0.43
60	20100	Rubber Footwear	31.38	0.07	0.28	0.73
264	50600	Abrasive Products	23.67	0.16	0.67	1.76
178	50400	Pillows, Comforters, and Quilts	23.64	0.10	0.43	1.13
73	20301	Hosiery	20.92	0.04	0.17	0.46
387	90100	Book Publishing	18.21	0.01	0.05	0.14
223	50500	Thread Mills	16.74	1.04	4.46	11.92
106	20400	Military Accessories	10.06	0.15	0.63	1.66

*Based on the second approach.

Sources: Cotton Counts Its Customers and RTI Computations. Tables VI-13 and VI-14a.

The resulting estimates of percentage contraction of demand for final products due to the compliance with cotton dust exposure limits are then multiplied by the total cotton yarn consumption of each PCE item to derive the estimates of reductions in cotton yarn demand. These estimates of reductions in cotton yarn demand attributable to each PCE item are aggregated for the total 477 PCE items to obtain the estimate of total contraction of cotton yarn consumption. The estimates indicate that output price increases for each PCE item due to compliance costs will result in a contraction of cotton yarn consumption by 14.0, 57.3 and 151.1 million pounds for 0.5, 0.2 and 0.1 mg/m^3 limits, respectively. These quantities are 0.33, 1.33 and 3.51 percent of the 1967 total mill cotton consumption of 4303 million pounds.

These estimates of the contraction of cotton yarn consumption due to the compliance costs can be cross-checked with an alternative estimation method. NCCA's "Cotton Counts Its Customers, 1969"[9], provides the 1967 cotton consumption data for the major end-use groups and the elasticities of input substitution between cotton and non-cellulosic fiber are available from a USDA inter-fiber study (1974)[12] as shown in Table VI-15.

From the last column of Table VI-9 it can be seen that the cotton/non-cellulosic fiber relative price will be increased by 1.70, 7.0 and 18.3 percent for major SIC sectors 2211, 2221, and 2281 due to the 0.5, 0.2 and 0.1 exposure limits, respectively. Utilizing this information, one can obtain the estimated declines in cotton demand by each major end-user due to interfiber substitution. These results are shown in the last column of Table VI-15. The total declines of cotton yarn consumption due to interfiber substitution at 1967 output levels, which are 17.6, 72.3 and 189.1 million pounds for the three exposure limits, do not vary significantly from the estimates obtained earlier using the output demand elas-

Table VI-15. Demand Effects of Interfiber Substitution at 1967 Levels of Output

End-Use Group	1967 Cotton Consumption (10^6 lbs.)[a]	Elasticity of Substitution[b]	Decline in Cotton Demand Due to Interfiber Substitution[c] (10^6 lbs.)		
			0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Men's Apparel	1373	-.09	2.101	8.650	22.613
Women's and Girls' Apparel	703	-.18	2.151	8.858	23.157
Home Furnishings	1403	-.20	4.770	19.642	51.350
Industrial Uses	824	-.61	8.545	35.185	91.983
Total	4303		17.567	72.335	189.103

Source: [a]NACC, "Cotton Counts Its Customers, 1969" [9].

[b]USDA Inter-Fiber Study (1974) [12].

[c]Computed by RTI using the estimated price increases from Table VI-9.

ticities and output price increases, i.e., 14.0, 57.3 and 151.1 million pounds. If it is assumed that consumer response to cotton product price increases will be mainly to switch from cotton textile products to manmade fiber textile products, those two alternative estimation methods should provide similar results. Since one cannot be certain which method provides the most accurate results, it was decided to choose the higher figures for the contraction of cotton yarn consumption, namely 17.6, 72.3 and 189.1 million pounds for the three exposure limits, to thus insure that the magnitude of the impact will not be understated. These figures imply that compliance with the OSHA limits of 0.5, 0.2 and 0.1 mg/m^3 will result in the contraction of cotton yarn consumption by 0.41, 1.68 and 4.39 percent, based on the 1967 consumption levels in the absence of exposure limits.

Similar computations were performed on 1972 cotton consumption data by major end-use groups and reported as shown in Table VI-16. Based on these data, the total contraction of cotton yarn consumption due to the OSHA exposure limits of 0.5, 0.2 and 0.1 mg/m^3 are 14.2 million pounds (0.39 percent of the 1972 mill cotton consumption of 3655.2 million pounds), 58.3 million pounds (1.60 percent), and 152.5 million pounds (4.17 percent), respectively.

3) *Reduction of Employment*

In order to assess the employment impact of the OSHA cotton dust exposure limits, it is necessary to identify textile workers who will be directly influenced by the contraction of cotton yarn consumption. It is conceivable that workers in textile finishing, knitting or apparel plants will also be influenced by the contraction of cotton yarn consumption. However, influences on these workers will involve mainly some dislocation within the same industry sector because most of these plants produce both cotton and manmade fiber products. The major impact

Table VI-16. Demand Effects of Interfiber Substitution at 1972 Levels of Output

End-Use Group	1972 Cotton Consumption[a] (10^6 lbs.)	Decline in Cotton Demand Due to Interfiber Substitution[b] (10^6 lbs.)		
		0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Men's Apparel	1117.9	1.710	7.043	18.412
Women's and Girls' Apparel	602.4	1.843	7.590	19.843
Home Furnishings	1356.5	4.612	18.991	49.648
Industrial Uses	578.4	5,998	24.698	64.567
Total	3655.2	14.163	58.322	152.47

Sources: [a]NACC "Cotton Counts Its Customers, 1975" [9].

[b]Computed by RTI using the elasticities of substitution shown in Table VI-15 and the estimated price increases from Table VI-9.

upon employment will be in the yarn spinning and weaving sectors. All the SIC sectors studied (except SIC 2211) include plants which do not specialize in cotton products. Therefore, it is difficult to derive the employment-output relation directly related to the cotton yarn consumption level from the data on these sectors.

SIC Code 2211 (Weaving Mills, Cotton) had total employment of 121,300 and total raw cotton consumption of 2027.6 million pounds in 1972 (see Tables VI-1a, and C-1), indicating that 59.8 employees per year in this industry in yarn spinning and weaving processes will be directly affected by a contraction of one million pounds in the annual consumption of cotton yarn, ignoring process losses between raw cotton and cotton yarn. Similar information derived for SIC 2281 (Yarn Mills, Except Wool)[13] indicates that only 34.4 employees will be affected in the cotton yarn spinning process by a contraction of one million pounds in annual cotton yarn consumption. Total employment of 34,000 persons in SIC 2281, who specialized in cotton yarn spinning, was obtained from Table 5A of *Census of Manufacturers 1972*. This represents 38.2 percent of total employment in SIC Code 2281. Dividing this employment number by raw cotton consumption in SIC Code 2281 (987.6 million pounds), resulted in the 34.4 employees per one million pounds of cotton. The difference between the above two figures in SIC Codes 2211 and 2281 indicates that approximately 25.4 employees will be affected in the weaving process only due to a contraction of annual cotton yarn production of one million pounds.

When this labor/output ratio was applied (59.8 employees/million pounds of cotton yarn) to the contraction of cotton yarn consumption expected at the 1972 level of output, 14.2, 58.3 and 152.5 million pounds, the implication is that OSHA cotton dust exposure limits of 0.5, 0.2 and 0.1 mg/m^3 will result in a reduction of

employment by 850, 3487 and 9120 employees, respectively, for the cotton yarn spinning and weaving processes. These employment reductions may then be subtracted from the additional manpower required by the three exposure limits (393, 776, and 1049, respectively) (see Table VI-1a). The final result implies that employment in this part of the textile industry will be reduced by 457, 2711 and 8071 persons at the exposure limits of 0.5, 0.2 and 0.1 mg/m^3. These figures are 0.1, 0.6 and 1.8 percent of the 1972 total employment (450,400), respectively, in the six SIC sectors studied. However, it should be mentioned that the labor/output ratio, 59.8 employees/10^6 pounds, is biased upward to the extent cotton weaving mills consume yarns obtained from yarn spinners. Consequently, the employment impact may be biased upward, but this bias should not be substantial.

The employment impact of the proposed standards at the 1976 level of output will be less or similar to the above figures because the projected mill consumption of raw cotton for 1976 is substantially lower than the consumption level in 1972 (see Table VI-6). Therefore, the above result can be interpreted as meaning that the cotton dust exposure limits imposed on the 1976 level of output will reduce employment in this part of the textile industry at most by 0.1, 0.6 and 1.8 percent of the 1976 total employment, respectively, in the six SIC sectors.

Table VI-17 details the employment impact of proposed cotton dust exposure limits by SIC sector. Total reductions of employment are distributed to each of the six SIC sectors according to the share of raw cotton consumption out of total raw cotton consumption by the six SIC sectors.

As would be expected, SIC Code 2211 (Weaving Mills, Cotton) reveals the most significant reduction of employment, i.e., 0.2, 1.2 and 3.5 percent reduction of cur-

rent employment level for the 0.5, 0.2 and 0.1 mg/m^3 exposure limits, respectively. Approximately 53 percent of total employment reduction due to the proposed limits will fall within SIC Code 2211. While the next important raw cotton consuming SIC sector 2281 (Yarn Mills, Except Wool) reveals large employment reductions (0.1, 0.8 and 2.3 percent for the three exposure limits), all the remaining sectors reveal minor employment impacts except for 0.1 mg/m^3 limit. One should take account of the fact that the estimate of the employment impact for SIC Code 2281 was biased upward because it also includes employment reductions due to weaving processes. The reductions will, in fact, fall on other sectors which purchase cotton yarns from sector 2281. When this is taken into account, it seems clear that even the employment impact on SIC Code 2281 will not be very large, again with exception of 0.1 mg/m^3 limit.

* * * * *

Compliance by the cotton weaving industry with 0.2 and 0.1 mg/m^3 exposure limits will require 19.6 and 55.6 cents per dollar of sales, respectively, in capital costs which are significant. Somewhat surprising is the low capital compliance cost of 0.129 cents per dollar of sales for the 0.5 mg/m^3 exposure limit. These costs are effectively weighted averages of the costs for the individual sectors of the industry, SIC Codes 2211, 2221 and 2241. These costs and those for the individual sectors must be interpreted with care due to yarn purchases by non-integrated firms, but the $1.10 installed cost per sales dollar for SIC 2211 for the 0.1 mg/m^3 exposure limit are noteworthy. The corresponding cost for the 0.2 mg/m^3 limit is also worthy of note, at $0.39 per sales dollar.

* * * * *

Table VI-24 shows computations similar to those detailed above, but they are estimated per dollar of in-

dustry shipments for yarn consuming sectors. The final column of Table VI-24 shows the average price increase per dollar of sales required due to exposure limits on ginning, yarn spinning and yarn processing (weaving). This column is not equal to the sum of columns four and five due to cotton yarn purchases of non-integrated producers.

The price increases required for SIC Code 2211 (Weaving Mills, cotton) are 1.9, 17.8 and 47.0 cents per dollar of sales for the 0.5, 0.2 and 0.1 mg/m^3 exposure limits, respectively. Similarly, 0.4, 3.8 and 10.0 cents in price increases were required for SIC Code 2221 (Weaving Mills, manmade fiber and silk); 0.3, 3.2 and 8.4 cents for SIC Code 2241 (Narrow Fabric Mills); 0.3, 1.2 and 3.0 cents for SIC Code 2284 (Thread Mills); 0.2, 0.9 and 2.3 cents for SIC Code 2257 (Circular Knit Fabric Mills); and 0.1, 0.5 and 1.3 cents for SIC Code 2296 (Tire Cord and Fabric) to comply with the 0.5, 0.2 and 0.1 mg/m^3 exposure limits, respectively. It is particularly noteworthy that the imposition of the 0.1 mg/m^3 exposure limit on SIC Code 2211 (Weaving Mills, cotton) will result in a 47.0 percent price increase of its products.

* * * * *

d. *Impact on Market Structure and Marginal Industries for Cotton Weaving Sector and Cotton Waste and Linters Consuming Sectors*

Due to the lack of necessary financial data for the cotton ginning sector, the discussion of the capital availability problem in this section will be confined to cotton weaving sectors (SIC Codes 2211, 2221 and 2241) and cotton waste and linters consuming sectors (SIC Codes 2293, 2294, and 2515).

The ratios of capital requirements to profits after taxes for the three weaving sectors were computed using the

Table VI-24 Price Increases of Cotton Yarn Due to Exposure Limits on Ginning, Yarn Spinning and Yarn Processing ($/Dollar of Sales).

SIC Code	Value of Industry Shipments (10^6)	Total Quantity of Cotton Yarn Consumed (10^6 lbs.)	Exposure Limit mg/m^3	Price Increase due to Exposure Limit on Yarn Spinning ($/Dollar of Sales)	Additional Price Increase due to Exposure Limit on Ginning and Yarn Processing ($/Dollar of Sales)[a]	Price Increases due to Exposure Limit on Ginning, Yarn Spinning and Yarn Processing[b] ($/Dollar of Sales)
2211	2660.6	2227.2				
			0.5	.0155	.0022	.0190
			0.2	.0625	.1090	.1776
			0.1	.1644	.2893	.4701
2221	3856.3	694.1				
			0.5	.0038	.0005	.0041
			0.2	.0149	.0234	.0332
			0.1	.0389	.0622	.1011
2241	566.2	85.0				
			0.5	NA	.0004	.0034
			0.2	NA	.0195	.0319
			0.1	NA	.0513	.0843
2257	2008.8	215.7				
			0.5	.0006	.0001	.0020
			0.2	.0022	.0011	.0092
			0.1	.0056	.0012	.0233
2284	345.4	33.9				
			0.5	.0025	.0001	.0025
			0.2	.0106	.0013	.0118
			0.1	.0283	.0016	.0297
2296	685.1	41.0				
			0.5	.0013	.0001	.0013
			0.2	.0048	.0008	.0054
			0.1	.0119	.0010	.0127

[a] Values are the product of the additional price increase per pound due to exposure limits on ginning and yarn processing (from the third column of Table VI-23) and the quantity of cotton yarn consumed (column three of this table) divided by the value of industry shipments (column two of this table).

[b] Values are the product of the coefficients in the final column of Table VI-23 and the third column of this table, divided by the value of industry shipments (column two of this table).

Source: Value of Industry Shipments - Tables C-2, C-7, and C-30. Total Quantity of Cotton Yarn Consumed - Table C-28. Price Increase due to Exposure Limits on Yarn Spinning - Table VI-8.

compliance costs data contained in Table VI-26 and the price increase estimates from the final column of Table VI-24.

Table VI-27 clearly demonstrates that, except at the 0.5 mg/m³ exposure limit, the cotton weaving sectors (SIC Codes 2211, 2221, and 2241), will face difficult capital problems, as measured by the ratio of compliance costs to profits after taxes. For the sector most heavily impacted at the 0.1 mg/m³ exposure limits, namely SIC 2211 (Weaving Mills, Cotton), compliance capital expenditures for all size classes average 2910 percent of annual profits after taxes as compared to 1204 percent for SIC Code 2221 and 787 percent for SIC Code 2241. Further, for the fourth size class (firms with annual sales between $100,000 and $500,000) in SIC Code 2211, this ratio of costs to profits jumps to 66.29, implying expenditures of 6629 percent of after-tax profits. The lowest ratio for this sector at the 0.1 mg/m³ level is 21.00. For Sector 2221, the comparable ratios range from 7.05 to 46.96 for the 0.1 mg/m³ exposure limit, and SIC Code 2241 shows a range between 4.24 and 46.14 for the size classes with positive profits.

Although the ratios at the 0.2 mg/m³ exposure limit for each sector are significantly smaller for all size classes than at the 0.1 mg/m³ exposure limit, the implied expenditure levels are still substantial for SIC Code 2211 (Weaving Mills, Cotton). Ratios for SIC 2211 range from 10.02 to 49.83 and are approximately one half the 0.1 mg/m³ level for this sector. SIC Code 2221 faces the next highest compliance cost requirements at the 0.2 mg/m³ exposure limit, with ratios from between 2.67 to 23.45. The comparable range for SIC Code 2241 is 1.49 to 16.25.

Compliance cost expenditures in the cotton weaving sector fall to less than unity for nearly all size classes

Table VI-26. Installed and Annualized Compliance Costs Per Dollar of Sales ($/Dollar of Sales) Due to Exposure Limits on Cotton Ginning, Yarn Spinning and Yarn Processing: Three Cotton Weaving Sectors.

SIC Code	Exposure Limits mg/m^3	Installed Costs			Total Annualized Costs		
		Due to Yarn Spinning[a]	Due to Weaving[b]	Total	Due to Yarn Spinning[a]	Due to Ginning & Weaving[c]	Total
2211							
	0.5	.0419	.0025	.0444	.0122	.0022	.0144
	0.2	.1943	.3865	.5808	.0477	.1090	.1567
	0.1	.5525	1.0968	1.6493	.1225	.2893	.4118
2221							
	0.5	.0099	.0006	.0105	.0029	.0005	.0034
	0.2	.0459	.0831	.1290	.0113	.0234	.0347
	0.1	.1305	.2358	.3663	.0289	.0622	.0911
2241							
	0.5	.0	.0005	.0005	NA	.0004	.0034[d]
	0.2	.0	.0693	.0693	NA	.0195	.0319[d]
	0.1	.0	.1967	.1967	NA	.0519	.0843[d]

[a] From Table VI-5.

[b] From Installed Compliance Costs for Weaving Sectors in Table VI-22

[c] From the 5th column of Table VI-24

[d] Total annualized costs for SIC Code 2241 were assumed to be equal to price increases required as shown in the final column of Table VI-24

Table VI-27. Ratios of Compliance Cost to Profit After Taxes: Cotton Weaving Sectors.

Annual Sales	SIC 2211			SIC 2221			SIC 2241		
	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3	0.5 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Average, All Companies	1.610	15.97	29.10	0.410	4.80	12.04	0.0200	2.77	7.87
Under $25,000	-0.037	-0.49	-1.45	-0.009	-0.11	- 0.31	-0.0004	-0.06	- 0.16
$ 25,000 - $ 50,000	-3.170	130.76	35.30	-0.570	-8.47	-46.47	-0.0300	-3.61	-10.25
50,000 - 100,000	-1.450	-53.40	47.79	-0.300	-4.03	-15.20	-0.0100	-1.91	- 5.43
100,000 - 500,000	7.540	49.83	66.29	2.330	23.45	46.96	0.1200	16.25	46.14
500,000 - 1,000,000	2.490	20.82	32.39	0.680	7.51	17.30	0.0300	4.61	13.10
1,000,000 - 5,000,000	2.080	19.26	32.67	0.550	6.23	15.12	0.300	3.69	10.46
5,000,000 - 10,000,000	1.970	18.80	32.91	0.510	5.88	14.48	0.0200	3.45	9.76
10,000,000 - 50,000,000	1.620	16.09	29.37	0.420	4.82	12.10	0.0200	2.78	7.90
50,000,000 - 100,000,000	1.470	14.89	27.79	0.380	4.37	11.08	0.0200	2.51	7.12
100,000,000 - 250,000,000	1.440	14.60	27.27	0.370	4.28	10.86	0.0200	2.46	6.98
250,000,000 - 500,000,000	1.110	11.77	23.37	0.280	3.27	8.48	0.0100	1.85	5.25
500,000,000 - 1,000,000,000	1.550	15.31	27.87	0.400	4.60	11.54	0.0200	2.66	7.55
Over $1,000,000,000	0.910	10.02	21.00	0.220	2.67	7.05	0.0100	1.45	4.24

Source: Calculations are based on data in Tables VI-10, VI-23 and VI-26.

in two of the three SIC Codes (2221 and 2241) if the exposure limit is 0.5 mg/m³. For the remaining SIC Code 2211, capital requirements range from 91 to 754 percent of annual after-tax profits. The comparable range of ratios for SIC Code 2221 is 0.22 to 2.33 and 0.01 to 0.12 for SIC Code 2241.

The ratios for the three smallest size firms are quite volatile and are not particularly meaningful since small changes in costs, prices and profits for such small firms can cause very large changes in the ratios of compliance costs to profits after taxes. Most ratios for all firms with $100,000 or less annual sales are negative for all three exposure limits. But exceptions can occur, such as the second smallest firm size for SIC 2211, where the ratio changed from –3.17 to 130.76 as the exposure limit changed from 0.5 to 0.2 mg/m³. This resulted from an increase in price.

The evidence provided by Table VI-27 is clear. Even though the ability of firms in the cotton weaving sector to finance the burden of compliance costs internally generally increased as firm size increased, it is doubtful whether any firms could successfully finance the cost burden imposed by the 0.1 mg/m³ exposure limits from internal funds. The financial impact for SIC Code 2211 appears very high even for the 0.2 mg/m³ exposure limit. The 0.5 mg/m³ exposure limit would impact much less severely and the cost burden of compliance should be manageable for all but the three smallest firm sizes and possibly selected firms, especially in SIC Code 2211.

* * * * *

6) *Effect on Employment*

The employment impact of the proposed exposure limits upon the cotton textile industry is summarized in Table VI-38. The net reduction in employment will be small for the 0.5 mg/m³ exposure limit, but it will be 7275

and 22,256 persons of the 0.2 and 0.1 mg/m³ exposure limits, respectively. These represent 1.4 and 4.4 percent of the 1972 total employment (511,644 persons) in the ginning, yarn spinning and weaving sectors studied. The total employment reduction for the 0.1 mg/m³ limit (22,256 persons) accounts for .12 percent of the 1972 total employment in all U.S. manufacturing industries (19,028,700 employees). The employment reductions due to the 0.2 and 0.1 mg/m³ exposure limits were estimated by RTI to be 2711 and 8072 persons or .6 and 1.8 percent of current employment level when the limit is imposed on the yarn spinning process alone. Within the cotton textile industry, SIC Code 2211 (Weaving Mills, Cotton) revealed net employment reductions of 4901 and 13,458 persons or 4.0 and 11.1 percent of the current employment level (121,300 employees) for the exposure limits of 0.2 and 0.1 mg/m³, respectively, with limits imposed on cotton ginning, yarn spinning and weaving sectors.

7) *Effects on Market Structure*

The financial impact of cotton dust exposure limits, as measured by the ratio of compliance costs to profits after tax, is summarized in Table VI-39. The exposure limit of 0.1 mg/m³ in SIC Code 2211 (Weaving Mills, Cotton) exhibits extremely high ratios, ranging from 21.0 for the largest firms to 32.9 for smaller firms, ignoring the four smallest size classes. These ratios suggest that it will be very difficult for weaving firms specializing in cotton to finance compliance capital costs imposed by the 0.1 mg/m³ exposure limit. The impact of the 0.2 mg/m³ limit upon SIC Code 2211 is also quite severe, with ratios ranging from 10.0 to 20.8. These ratios indicate that unless the compliance capital investments are spread over a substantial number of years, all the companies engaged heavily in cotton yarn spinning and weaving processes will face severe difficulty in financing compliance capital for both the 0.2 and 0.1 mg/m³ exposure limits.

Table VI-38. Net Reduction in Employment Due to the Proposed Cotton Dust Exposure Limits: Three Major Sectors and Total Industry

SIC or Industry Sector	Exposure Limits mg/m3	1972 Total Employment	Net Reduction in Employment Due to Exposure Limits on Yarn Spinning Process Only		Net Reduction in Employment Due to Exposure Limits on Cotton Ginning, Yarn Spinning and Weaving Sectors	
			Number of Employees	Percent of the 1972 Employment Level	Number of Employees	Percent of the 1972 Employment Level
2211		121,300				
(Weaving Mills,	0.5		242	.2	386	.3
Cotton)	0.2		1,435	1.2	4,901	4.0
	0.1		4,269	3.5	13,459	11.1
2221		149,700				
(Weaving Mills,	0.5		83	.1	122	.1
manmade fiber and	0.2		491	.3	1,598	1.1
silk)	0.1		1,461	1.0	4,398	2.9
2281		89,700				
(Yarn Mills,	0.5		117	.1	41	.04
except wool)	0.2		699	.8	1,132	1.3
	0.1		2,080	2.3	3,255	3.6
Total of Yarn		450,400				
Spinning Sectors	0.5		457	.1		
(SIC Codes 2211,	0.2		2,711	.6		
2221, 2281, 2257,	0.1		8,072	1.8		
2284 and 2296)						
Total of Cotton		511,644				
Ginning, Yarn Spinning,	0.5				578	.1
and Weaving.	0.2				7,275	1.4
	0.1				22,256	4.4

Sources: Tables VI-17 and VI-33.

As shown in Tables VI-11 and VI-27, the ratios generally decline as company size increases, i.e., the ratios are larger for small size classes than for larger size classes. Also, the difference in the size of ratios between classes is quite pronounced, suggesting that the difficulty of financing the compliance capital costs will be more intense for smaller companies. Therefore, it is undeniable that the proposed cotton dust exposure limits of 0.2 and 0.1 mg/m^3 could impose some degree of limitation on market entry and increase concentration in the cotton yarn spinning and weaving sectors. However, the results in this analysis only point out the relative difficulties among size classes of companies and industry sectors. Because of severe data problems (lack of detailed financial data at the company level), it fails to identify specifically which plants will close or what proportion of total production capacity will be eliminated due to compliance capital requirements.

* * * * *

2) *Cotton System Machinery in Place*

a) *General*

For other than spinning frames, data were not available that would permit breaking down cotton system equipment by type of fiber processed, i.e., 100 percent cotton, 100 percent man-made, and cotton-man-made blends. For the purposes of the equipment inventory, it is assumed that other cotton system equipment will be distributed by fiber processed in the same ratio as spinning spindles. In 1973 the American Textile Manufacturers Institute reports the following distribution of spinning spindles by fiber processed [16]:

Fiber	*Percent Active*
100 percent cotton	55.1
100 percent man-made	13.4
other fibers and blends	31.5

Table VI-39. Ranges of Ratios of Compliance Capital Costs to Profit After Tax: Three Major Sectors

SIC	Exposure limits mg/m^3	Ranges of Ratios of Compliance Capital Costs to Profit After Tax[a]	
		When the limits are imposed on yarn spinning only	When the limits are imposed on ginning, yarn spinning and weaving
2211 (Weaving Mills, cotton)	0.5	.9 - 2.5	.9 - 2.5
	0.2	3.6 - 9.1	10.0 - 20.8
	0.1	8.0 - 13.5	21.0 - 32.9
2221 (Weaving Mills, manmade fiber and silk)	0.5	.2 - .6	.2 - .7
	0.2	1.0 - 2.7	2.7 - 7.5
	0.1	2.5 - 6.2	7.0 - 17.3
2281 (Yarn Mills, except wool)	0.5	.5 - 1.5	
	0.2	2.2 - 5.5	
	0.1	5.3 - 10.6	

[a] Ranges of ratios exclude those for the four smallest size classes. As may be noted in Table VI-10, the three smallest size classes reveal negative profits after taxes. The fourth smallest size class shows positive profit after tax but its value is extremely small compared with other larger size classes.

Sources: Table VI-11 and VI-27.

Table B-11. Costs Per Cubic Foot Per Minute of Air for Processing Equipment*

Equipment Type	1.0 mg/m^3				0.5 mg/m^3				0.2 mg/m^3			
	Air Required (CFM)	Capital Costs ($/CFM)	Operation & Maintenance ($/CFM/Yr)	Energy Consumed (Kwh/CFM/Yr)	Air Required (CFM)	Capital Costs ($/CFM)	Operation & Maintenance ($/CFM/Yr)	Energy Consumed (Kwh/CFM/Yr)	Air Required (CFM)	Capital Costs ($/CFM)	Operation & Maintenance ($/CFM/Yr)	Energy Consumed (Kwh/CFM/Yr)
Openers (Conventional)	8,000	1.50	.047	7.98	8,000	1.90	.059	12.62	8,600	2.89	.060	12.73
Pickers (Conventional)	8,500	1.59	.045	7.98	8,500	2.01	.053	12.62	8,600	2.97	.056	12.73
Openers (Chute)	15,070	1.56	.043	7.98	15,070	1.97	.053	12.62	15,670	2.99	.056	12.73
Cards	996	1.74	.048	11.07	996	2.19	.058	16.91	1,540	3.10	.054	12.73
Draw Frames	1,122	1.78	.030	7.03	1,122	2.24	.037	11.22	1,980	2.24	.034	12.73
Combers	-	-	-	-	-	-	-	-	800	2.18	.023	12.19
Roving Frames	-	-	-	-	1,540	2.43	.023	10.23	3,660	2.34	.029	12.68
Spinning Frames (Ring)	-	-	-	-	2	2.11	.062	11.70	8.75	2.31	.035	11.70
Spinning Frames (Open End)	-	-	-	-	2	2.11	.062	11.70	8.75	2.31	.035	11.70

Source: Research Triangle Institute.

*Air requirements and associated costs for the 0.1 mg/m^3 limit were not calculated. The methodology used for estimating costs at this level employed extrapolation from the control cost function rather than direct cost estimation based on air flow requirements.

Data on cotton system equipment is developed for each of the fiber categories listed above. The most conservative approach in estimating control costs would be to treat all equipment as if it were processing 100 percent cotton. A middle-of-the road approach would be to exclude the equipment processing 100 percent man-made fibers. The most liberal approach would be to consider costs for equipment processing 100 percent cotton and half of that processing blends. In 1973 it was estimated that 76 percent of the cotton used in blends was in 50-50 proportions [17].

The basic source of data on cotton system equipment is the Bureau of the Census special report, *Textile Machinery in Place* [18]. The data in this report are an aggregation of reports from companies representing 90 percent of the employment in the textile fiber and yarn preparation industry. The following nationwide totals are estimated by dividing the Bureau of Census data by 0.9.

* * * * *

4) *Raw Cotton Processed by Equipment Type*

In this section estimates of the average amounts of raw cotton processed per unit of equipment are developed. These data are necessary to transform the control costs, expressed in terms of unit of equipment, to dollars per pound of raw cotton. The latter figure is required for input into the Input-Output model used in evaluating the economic impact of proposed cotton dust exposure limits, in which the throughput of cotton by industry classification forms one basis of the analytical model.

Except for combs and cards, calculations of raw cotton processed per unit of equipment are relatively straight forward and involve dividing the annual raw cotton consumption by the units of equipments in place developed in Section C, above. Distribution of raw cotton to carding systems requires consideration of nominal capacities

of high and low speed cards. Distribution of raw cotton to combing systems requires consideration of the percent of cotton end use requiring combed yarn.

As previously mentioned, economic evaluation can be made using control costs for:

A. All cotton system equipment in place.

B. Cotton system equipment producing 100 percent cotton fiber and cotton blends.

C. Cotton system equipment producing 100 percent cotton fiber and half of the equipment producing cotton blends.

Calculated equivalent raw cotton throughput by types of cotton systems equipment are shown in Table B-14. Details of calculation and basis of distribution are presented in Tables B-15 through B-21. All calculations are based on the 1973 raw cotton consumption of 7,078,000 bales (480 lbs./bale).

Calculations based on all fibers produced (A above) are converted to category B by dividing by 0.866, the percent of all equipment less equipment producing 100 percent man-made fibers; and for category C by dividing by 0.709, the percent of all equipment less equipment producing 100 percent man-made fibers and one-half of the equipment producing cotton blends.

* * * * *

Plant and equipment expenditures in constant 1974 dollars declined sharply in the textile industry from 1948 to 1958 as shown in Table C-12. However, by 1974 the expenditures reached the record high amount of $840 million in current dollars, and according to Department of Commerce forecasts the 1976 spending ($850 million) will exceed 1974 levels. * * * These expenditures are small when compared to the paper industry ($2,533 million)

Table C-11. Cotton System Spindle Activity

Year	Number of Cotton System Spindles (10^6) In Place	Number of Cotton System Spindles (10^6) Active	Spindle Hours Operated (10^9 Hours)	Index of Cotton System Activity (Based on 132 Hours Per Week Per Spindle)
1959	20.274	19.248	122.7	82.8
1960	19.956	19.221	120.1	74.6
1961	19.603	18.986	117.0	72.4
1962	19.491	18.764	118.7	74.5
1963	19.302	18.634	118.1	76.2
1964	19.322	18.472	124.6	80.1
1965	19.332	18.757	128.0	81.7
1966	20.046	19.467	132.1	97.6
1967	20.605	20.041	126.2	90.0
1968	20.513	19.996	128.0	91.0
1969	20.133	19.562	125.6	88.6
1970	19.559	18.599	113.0	83.1
1971	19.215	18.424	113.8	84.3
1972	19.089	18.301	115.8	88.2
1973	18.890	18.036	116.0	89.1
1974	18.606	17.255	106.3	82.2

Source: American Textile Manufacturers Institute, Inc., Textile Hi-Lights, various issues.

Table C-12. Plant and Equipment Expenditures, $ million
(1974 Constant Dollars)

Year	Textiles	Paper	All Manufacturing	Wholesale Price Index of Machinery & Equipment (1967 = 100)
1947	1323.910	960.483	NA	53.7
1948	1389.210	910.170	21580.6	58.2
1949	1051.210	685.573	16270.9	61.0
1950	949.951	729.032	16325.9	63.1
1951	949.105	830.467	21176.9	70.5
1952	789.801	710.821	22608.0	70.6
1953	656.453	791.605	22898.6	72.2
1954	569.754	854.631	21346.8	73.4
1955	570.857	939.153	21895.2	75.7
1956	647.578	1687.11	26244.0	81.8
1957	509.223	1273.06	26272.7	87.6
1958	343.042	888.791	19303.9	89.4
1959	458.049	946.636	19497.6	91.3
1960	560.629	1166.72	22864.6	92.0
1961	500.565	970.793	21736.7	91.9
1962	575.781	1000.04	22819.1	92.0
1963	650.129	1088.59	24523.5	92.2
1964	781.119	1457.09	29051.6	92.8
1965	979.807	1811.16	34798.0	93.9
1966	1180.87	2059.32	40610.3	96.8
1967	947.918	2174.64	39742.9	100.0
1968	715.909	1783.02	38321.4	103.2
1969	824.618	1859.97	41466.5	106.5
1970	700.753	1748.13	39980.4	111.4
1971	736.224	1444.69	36195.7	115.5
1972	863.120	1561.89	37056.9	117.9
1973	881.937	2037.73	43538.1	121.7
1974	839.999	2533.00	45689.9	139.4

Sources: ATMI, Survey of Current Business and Textile Hi-Lights

in 1974 and to the all-manufacturing average ($45,690 million) for the same year. * * * This decline in textile plant and equipment expenditures as compared to similar activity in all manufacturing and the paper industry suggests that perhaps this investment profile can, in part, be explained by declining or stagnant profit margins.

* * * * *

6. *Profitability*

Net profit per dollar of sales in the textile industry is somewhat cyclical but has typically ranged from about 2 cents to 3 cents since the mid-1950's (3 cents to 8 cents from the mid-1940's to the mid-1950's). As shown in Table C-17, the paper industry typically earned 4 to 8 cents per dollar of sales over the 1947-74 period. The pattern for all manufacturing was similar to that of textiles except the level of net profits per sales dollar was about twice that of textiles. Cash available for investment per dollar of sales for the textile industry and for all manufacturing has been in the 4 to 5.5 cents range since the early 1960's.

As shown in Table C-18, total assets per dollar of sales in the textile industry has averaged 60-70 cents since the mid-1950's, but the recent trend is downward. The rate of return to investment for textile firms as a whole improved relative to all manufacturing firms from 1969-74, and while the rate of return to investment in textiles has historically been low, in the 2-3 percent range, it rose to approximately 4 percent after 1971.

* * * * *

8. *Fiber Consumption*

Cotton's share of the total domestic fiber market has declined consistently from the 1947-52 average of about 70 percent to 29.5 percent of the market in 1974. Cotton's market share remained above 50 percent until 1967, as shown in Table C-20, after which it dropped rapidly. The decline in mill consumption of cotton in the U.S. was

due primarily to the development of synthetic fibers and yarns, and in particular the development of textured yarns. Fabrics made from some synthetic fibers have historically possessed attractive properties such as superior wear and easy-care properties, but many of these fabrics were smooth and slippery to the touch and felt clammy when worn next to the skin. They often did not possess the warmth and comfort of fabrics made from cotton and other natural fibers. Synthetic yarns spun from staple afforded some of the advantages of cotton, and helped alleviate some of the disadvantages of filament yarns, but not all of them. Textured yarns followed.

Fabrics made from textured yarns have greater bulk, drier hand, high covering power, increased comfort, increased moisture absorption, improved thermal insulation, and more subdued luster when compared to fabrics made from continuous filament yarns. When compared to fabrics made from spun staple of equivalent denier *, fabrics made from textured yarns have (typically) equal or lower bulk density, a drier and crisper handle, a significantly improved freedom from pilling, and much greater uniformity. These properties substantially improve the quality of the fabric and add to consumer satisfaction. In addition, blends of cotton and synthetics, primarily nylon and polyester, have cut substantially into the market for cotton. In 1974, consumption of man-made fiber at the mill level constituted almost 70 percent of the market.

* * * * *

As shown in Tables C-21 and C-22, increasing import trade balances of cotton correspond to the decline of cotton's share of total mill consumption. The net cotton export balance dropped sharply during the 1950's and was reversed to a net import trade balance in 1960. The figures in the last column of Table C-21 represent the

* A unit of fineness for silk, rayon or nylon yarn equal to the fineness of yarn weighing one gram for each 9,000 meters.

share of domestic raw cotton out of total domestic consumption of cotton. The ratio has dropped consistently from 1.11 in 1948 to 0.97 in 1974. This implies that more than 8 percent of domestic cotton consumption was provided (on net) by foreign suppliers in 1974. (Domestic cotton consumption is the mill cotton consumption adjusted for imports and exports of cotton.)

* * * * *

9. *Interfiber Competition*

Cotton and man-made fibers compete for markets on the basis of both price and non-price factors. A USDA study[2] notes that non-price factors have probably dominated in the past. As examples of non-price factors, the USDA study lists the following: new man-made fibers with characteristics appealing to consumers, or with specific properties applicable to industrial use; large expenditures on research, development and promotion by man-made fiber industries; and the availability and quality of supply. Prior to the energy shortage, mills were generally assured of a predictable supply of man-made fiber of a constant quality and at relatively stable, predictable prices. Wholesale fiber prices and the price of man-made fibers relative to cotton are given in Table C-23.[*] Production and quality of cotton are less dependable. Such factors as weather, insects, and government programs, none of which can be predicted with certainty, affect quality, quantity, and prices of cotton[2].

At this point, a short discussion of technical difficulties of interfiber substitution is relevant. In order for cotton and man-made fiber to compete directly on the basis of price, shifts back and forth between them must be easily made at all levels between producer and consumer. The USDA study points out that ". . . at the mill level, it is difficult and time-consuming to change from production of 100 percent man-made fiber to production of 100 percent cotton fiber, or vice versa. Major difficulties may

---

[* This table omitted in printing.]

even be encountered in shifting from production of man-made fiber-cotton blends to production of 100 percent cotton fabrics. All of one fiber must be run out of the machines which are changing fiber and the machines must be thoroughly cleaned. This is a major undertaking and, naturally, quite time-consuming. During the change, neither labor nor machines operate at peak efficiency. So, once a mill shifts from cotton to man-made fiber in response to an anticipated price or supply movement, it is unlikely that the change will be reversed unless planners at the individual mill level feel they must do so to avert a severe profit squeeze or to respond to strong consumer demand. This explains in part the difficulty cotton experiences when attempting to recover markets in a specific end-use once it has been displaced.

In this study, the inter-fiber competition based on price factors is analyzed only at the end-use level because, as shown in the USDA study cited above, the cross-price elasticities of cotton vary significantly among the major end-users. The distribution of cotton consumption by major end-users is shown in Table C-24. The end-use data are published by Textiles Economic Bureau, Inc.[3].

Home furnishings is the largest end-use of cotton of the four markets, followed by men's and boys' apparel. In 1973, 36 and 32 percent of all cotton were used in home furnishings and men's and boys' apparel, respectively. Within the home furnishings category, the largest use of cotton is sheets, where four-fifths of the fiber used is cotton. In the other major end-use product, towels, cotton accounts for 98 percent of the fiber used.

The USDA study also indicates that a 10 percent increase in the cotton/non-cellulosic price relationship

Table C-24. Distribution of Cotton Consumption by Major End-Uses for 1972, 1973, and 1974.

	1972		1973		1974	
	Quantity (10^6 lbs)	Percent	Quantity (10^6 lbs)	Percent	Quantity (10^6 lbs)	Percent
Men's and Boy's Apparel	1117.9	30.6	1085.8	32.0	1044.0	33.5
Women's, Misses, Children's and Infants' Apparel	602.4	16.5	522.2	15.4	478.1	15.4
Home Furnishings	1356.5	37.1	1232.6	36.3	1103.0	35.4
Industrial Uses	578.4	15.8	556.3	16.4	486.7	15.6
Total	3655.2		3397.4		3112.3	

Source: National Cotton Council of America, Cotton Counts Its Customers

elicits the following percentage declines in cotton demand by each major end-user:

Men's Apparel:	0.9 percent
Women's Apparel:	1.8 percent
Home Furnishings:	2.0 percent
Industrial Uses:	6.1 percent

The above estimations are based on the observation that much of the displacement of cotton occurred as non-cellulosics became more price-competitive with cotton.

The cross-price elasticities of cotton in men's wear is the lowest (and statistically insignificant) among the four major end-users. The USDA explains that this is not particularly surprising because over half of this market is in utility-type clothing and underwear. Prices would be a minor consideration affecting demand, as these products are relatively low priced; non-price factors seem to dominate. For example, cotton reportedly wears better than blends or man-made fibers in work clothes and men's underwear. The industrial users reveal the highest cross-price elasticity among the four end-users. Uses in this category include sewing thread, cordage, coated fabrics such as parachutes and transportation upholstery. Man-made fiber penetration has caused cotton's share of the market to fall from over half in the early 1950's to less than one-third by the early 1970's. Much cotton has been displaced in end-uses such as cordage. But it is important to note that the high historical estimate of cross-price elasticity should be used with caution because this relatively high elasticity may indicate only that most potential cotton displacement has already transpired[2].

In the USDA's regression equation, the total fiber demand variable in each major end-user group was included as a proxy variable for all macro-demand shifters af-

fecting individual fibers, such as income, technological advances, and changing tastes and preferences. Therefore, the estimates of cross-price elasticity portray the competitive relationships between cotton and non-cellulosics for a given level of total fiber demand. In the impact analysis, it was assumed that all macro-demand shifters remain constant for a given year. Therefore, these elasticity estimates are suitable for our purpose. The reduction of cotton demand due to inter-fiber substitution can be added to the reduction of cotton consumption due to the decrease of final demand for textile consumer products resulting from the output price increase.

10. *Foreign Trade*

During 1961, the U.S. requested that the nations of the General Agreement on Tariffs and Trade (GATT) convene and seek solutions to what were publicised as growing international problems in the trade of textiles and apparel products. The immediate results of the 1961 GATT meeting was the Short Term Arrangement Regarding International Trade in Cotton Textiles (STA), which was a temporary measure lasting one year, until October 1, 1962, when the Long Term Arrangement Regarding International Trade in Cotton Textile (LTA) came into effect. Both of these agreements relate only to cotton and apparel products composed of 100% cotton or chief-fiber or chief-value blends of cotton (over 50% cotton by weight or value, respectively). Under both of these agreements the U.S. imposed 5 percent quotas on the annual growth rate of cotton textile and apparel imports using the vehicle of bilateral agreements, mostly with nations outside the industrial Western world. The LTA was renewed twice and expired on December 31, 1973.

Under the general terms of the LTA, international trade of these products was limited only when the ex-

ports caused disruptive effects on the markets of the importing nations. Market disruptions, relative to textiles and as discussed by GATT, were situations which contained the following elements, most probably in combination: a) serious damage to domestic producers of textile and apparel products (or the threat of serious damage) from imports of these products from a particular source; any such damage or potential damage had to result directly from market disruption and not from technological change, change in consumer tastes and preferences or changes in other factors causing shifts in supply and/or demand; b) sharp and substantial increase or potential increases of imports of textile and apparel products from particular nations or sources; c) these products offered at substantially lower prices than the prevailing domestic market price for similar goods of comparable quality in the importing country.

In the U.S. in late 1961, depreciation allowances were liberalized for investment in textile machinery, equipment and other capital items, and provided considerable incentive for new investment in the U.S. textile industry. Specific tax provisions reduced the average tax-life of textile mill equipment from 25 to 14 years, except for finishing equipment which was reduced to twelve years. Currently, the U.S. government is developing new depreciation schedules for textile capital, presumably for use in 1976.

When the tax incentives were combined with the import protection provided by the STA and LTA and amplified by the fairly rapid 5 percent average annual rate of growth of real U.S. domestic textile demand during most of the 1960's, investment in the U.S. textile industry expanded very rapidly. Expenditures on new plant and equipment in the textile mill sector increased in constant (1974) dollars from the $500 million in 1961 to $1,181 million in 1966, dropped to $948 million in

1967, $716 million in 1968, and rose to about $825 million in 1969. From about $700 million in 1970, there was an increase to $882 million in 1973 and a drop to $840 million in 1974 and to $660 million in 1975. Some of the expenditures on plant and equipment in the early 1970's in the U.S. textile industry were stimulated by increased export demand resulting from international monetary adjustments.

Domestic demand for textile products declined in the U.S. in the late 1960's, but the gradual increase in total imports of manmade fiber products that existed throughout most of the 1960's increased sharply in the late 1960's. By 1970 over $1.94 billion of foreign textile manufacturers reached U.S. markets. Of this import figure, about $1.05 billion was attributable to manmade fiber products, about $536 million was cotton products, and $358 million was wool products. In 1971 imports of manmade fiber products into the U.S. increased 50 percent over the 1970 figure to over $1.55 billion, as compared to $590 million for cotton products, $292 million for wool products, $2.435 billion for the total imports of textile manufactures, and $2.9 billion for total textile imports.

Textile manufactures, as discussed here, are essentially manufactured textile products and are a good measure of the foreign trade activity most central to the industries of interest in this study, namely SIC Codes 2211, 2221, and 2281. In this sense, textile manufactures consist of yarns, broadwoven fabrics, woven and knitted apparel, make-up goods (pillow cases, dish towels, other towels, table cloths, sheets, bedspreads, quilts, etc.), and miscellaneous items not classified elsewhere (woven elastic, fishing nets, etc.) See Tables C-25, C-26 and C-27 for additional data.

Given these data, it is clear that the LTA, with its singular emphasis upon cotton and cotton blends, was

inadequate to control the growth rate of textile and apparel imports into the U.S. As a consequence, in 1971 President Nixon's Administration led the negotiation of new bilateral trade agreements with five countries (Japan, Taiwan, Hong Kong, South Korea, and Malaysia) covering exports to the U.S. wool and man-made fiber textiles and apparel, in addition to cotton textile and apparel products covered under the LTA. These agreements imposed trade limitations upon some eighteen classifications of textile and apparel products from Japan, covering some 50 percent of Japanese exports of wool and manmade fiber products to the U.S., and ten categories, covering about 80 percent of their U.S. exports, for the other countries. These became effective on October 1, 1971. Under the terms of these agreements, Japan agreed to limit the rate of growth of exports of these classifications of textile and apparel products to the U.S. to 5 percent per year for man-made and one percent for woolen products for three years, while the other agreements were for five years and limited the rate of growth of exports of these products to the U.S. to approximately 7.5 percent per year. In 1973, additional agreements were negotiated with Singapore and Macao.

These agreements were neither a comprehensive nor a long-run solution, and a more general international framework was sought. In the Multi-lateral Trade Negotiations in Geneva, which dealt with all international trade activities (including textiles and apparel), and in other negotiations, GATT developed the Arrangement Regarding International Trade in Textiles or the Multi-Fiber Arrangement Regarding International Trade in Textiles (MFA), which was accepted by the U.S. and became effective on January 1, 1974. Under the MFA, the U.S. negotiated bilateral agreements with some sixteen countries covering cotton, wool and manmade fiber products. The terms of each of these agreements differ some-

what, but the rate of growth of exports from these countries to the U.S. typically is in the six to seven percent range for included products.

The international monetary changes since August of 1971 have had a significant effect upon foreign trade of U.S. textile products, which have become more competitive in world markets. Total textile exports increased from $837 million in 1971 to $993 million in 1972, $1.5 billion in 1973, $2.16 billion in 1974 and dropped slightly to $2.03 billion in 1975. During the same time period, exports of textile cotton manufactures increased from 694.8 million equivalent square yards in 1971 to 1.215 billion square yards in 1974, dropping to 1.046 billion yards in 1975; all major components of cotton textile manufactures showed increases, the smallest absolute and percentage increase being cotton yarns.

Imports of textile manufactures levelled off in the 1972-75 period in the $2.85 to $3.2 billion range, due to monetary adjustments, the trade agreements of 1971, and the Multi-Fiber Agreement. The People's Republic of China, not currently participating in a limiting trade agreement with the U.S., increased exports to the U.S. from about 85 million square yards equivalent (SYE) in 1974 to about 139 million SYE in 1975, mostly in the woven cotton fabric market.

Large changes in the relative prices of domestic and foreign textile and apparel products do have an impact upon the domestic textile industry; the dollar devaluations caused observable export response. However, small price changes have had very little impact, and, in general, the trade agreements dampen the effects on domestic markets of small changes in relative prices.

EXHIBIT 11

Statement of Dr. Arend Bouhuys

Byssinosis—in its acute as well as its chronic stages—is a significant hazard to health among workers exposed to cotton dust. Conservative estimates are that at least some 17,000 workers in the cotton fiber processing industry were at risk of the acute effects of cotton dust exposure in 1969 (Zuskin et al., Arch. Envir. Health, 19: 666, 1969), while there may be at least some 35,000 men and women (of these, 15,000 younger than 65 years of age) with disabling loss of lung function related to their work in the cotton textile industry in the United States (Bouhuys et al., Chronic respiratory disease in cotton textile workers; submitted for publication, 1977). Thus, large numbers of cotton textile workers are either affected by recurrent shortness of breath, chest tightness and other symptoms associated with a temporary effect of cotton dust on the lungs during exposure at work, or have sustained permanent damage to lung function, and concomitant chronic shortness of breath and other symptoms as a result of long-standing exposure to dust in cotton textile mills. Among the latter, many retire prematurely because of chest symptoms and respiratory disability (e.g. Bouhuys et al., New Engl. J. Med., 277: 170, 1967).

* * * * *

(6) I assume that "affected employees" refers to "employees affected by the standard." Considering that some cases of byssinosis have been observed even in workplaces with respirable dust levels less than 200 ug/m^3 (e.g. in Merchant et al.'s studies in North Carolina), and that byssinosis rates from 13 to 26% have been observed in carding and spinning rooms with respirable dust levels around 500 ug/m^3 (data from Bouhuys et al., Ann. Int. Med. 71: 257, 1969, and from Zuskin et al.,

Arch. Envir. Health, 19: 666, 1969), I do not consider that the proposed standards include any clear margin of safety. In fact, it is likely that some workers may continue to be affected by dust exposure, at least during work on Mondays, even when the standard is fully implemented in all cotton textile mills. However, it is likely that the standard is sufficient to avoid severe acute effects of dust exposure in a large majority of workers at risk, and it is also probable that implementation of the standard would greatly decrease the prevalence of disabling chronic lung disease among cotton textile workers in the future. In comparison with margins of safety which are considered in setting standards for other environmental exposures, e.g., those to outdoor air pollutants or to food additives, the proposed standard for cotton dust is considerably less stringent.

(7) The reversible physiological changes induced by cotton dust exposure need to be prevented and should therefore be considered in establishing a standard. The reversible effects of cotton dust exposure on the lungs of workers constitute a recurrent insult to their lungs which is unacceptable if only for the fact that they are associated with symptoms of cough, chest tightness, shortness of breath, and wheezing. In addition, it is likely although not definitely established that recurrent acute effects of dust exposure contribute to the insidious development of chronic lung disease. Finally, there is evidence that the acute effect of hemp dust on lung function may be accompanied by temporary decreases of arterial oxygen partial pressures (Lopez-Martino et al., Am. Rev. Res. Dis., 107: 809, 1973). Similar studies have not been reported for cotton textile workers, but since the acute effects of cotton and hemp dusts on lung function are similar, prudence indicates the assumption that temporary hypoxemia may also result from acute dust exposures to cotton dust. There can be little question that any

exposure which may result in temporary disturbances of the supply of oxygen to the tissues of the human body needs to be prevented.

* * * * *

Byssinosis has been recognized as an important health hazard to U.S. cotton textile workers since 1967.

* * * * *

(2) *Relations between byssinosis and chronic bronchitis.* —Some authors have described byssinosis as a form of chronic bronchitis, with some added acute effects due to short-term dust exposure. However, the accepted definition of chronic bronchitis is merly that of a syndrome consisting of chronic cough and sputum production which has persisted over a defined period, usually 3 years. The term "chronic bronchitis" carries no implications about etiology nor does it allow one to distinguish between various causes of that particular symptom complex. To a large extent, the continuing discussion concerning the coexistence of chronic bronchitis and of byssinosis is one of semantics. Cotton and other textile workers are at risk of acute as well as chronic respiratory symptoms and lung function loss. There is little or no doubt that both are caused by exposure to respirable dust in cotton textile factories. Although the progression from repeated acute insults to the chronic disease has not been traced with certainty, there is no good evidence against—and much evidence for—such a train of events. It seems most logical to define byssinosis as a dust-induced disease with initia acute responses followed by a stage of chronic lung disease characterized by chronic airway obstruction. This definition is implicit in the description of the clinical stages of byssinosis given by Schilling many years ago. There is little or no reason to describe cotton textile workers who, as a part of this disease, complain of chronic cough and of chronic sputum production as having some separate disease entity labeled chronic bronchitis.

Rather, it should be understood that the term "chronic bronchitis" is merely a convenient label, which has been useful in epidemiological studies, to describe persons who cough and who produce sputum, whatever the cause may be.

* * * * *

Disabling lung function loss was found among lifelong non-smoking cotton textile workers in South Carolina (4 men, 26 women aged 45 and over). The larger number of disabled non-smoking women reflects the fact that 70% of all women in the textile worker study had never smoked; among the men, this percentage was only 27%. In the same age group, there were 14 male and 10 female smokers and ex-smokers with equally severe function loss ($FEV_{1.0} < 1.20$ liters). These smokers and ex-smokers were, on the average, 5.7 years younger than the disabled non-smokers. This difference in mean age was statistically significant ($p < 0.01$). Hence the additive effects of textile dust exposure and of smoking (see above) appear to decrease the age at which textile workers become disabled. Careful review of the records of all disabled individuals did not reveal any causes of lung function loss other than textile dust exposure and smoking.

The proposed standard document states (p. 56498, col. 3, I. Background, A. General, first paragraph) that at least 800,000 workers were employed in the cotton fiber processing industry in the United States in 1973. Our population includes 302 active workers, 165 retired workers aged 45-64 years, and 178 retired workers 65 years and older. A crude estimate of the impact of disabling byssinosis in the U.S. can be made from these figures. If, of the 800,000 employed, 200,000 are at risk in dusty jobs and aged 45-64 years, there may be at least an additional 225,000 persons (109,000 aged 45-64; 118,000 aged 65+) who are no longer employed in the industry. The prevalence of disabling function loss ($FEV_{1.0} < 1.20$ liters) in our population is 4.9% for all 45-64 year olds,

and 17.4% for the men and women aged 65 years and older. If these percentages reflect average prevalences in U.S. cotton textile workers, one estimates that there may be at least 35,000 men and women with disabling function loss related to their work in the cotton textile industry in the U.S. Of these, about 15,000 would be 64 years or younger.

The above estimate represents, of course, an extrapolation from limited data and should not be considered as anything but a crude estimate. But since we were much more likely to trace active workers (who still lived and worked in the area where we conducted our survey) than retired workers (many of whom moved away or were untraceable) it is unlikely that we overestimate the prevalence of disabling lung function loss among the population of cotton textile workers which we studied. There are at present no other data except those quoted for Spanish hemp workers which might allow an independent estimate. Studies which include retired as well as active workers have not been reported from any country where significant numbers of people are at risk of cotton dust exposure. The one study in Spain suggests that our estimate for the U.S. may, if anything, underestimate the prevalence of disabling lung disease associated with textile dust exposure.

In conclusion, I support the adoption of the proposed standard for cotton dust exposure and urge its implementation on the shortest term feasible. Further delays in preventing an occupational lung disease which has been known since more than 100 years, and which has been documented by several independent investigators in the U.S. during the past ten years, should not be acceptable in our society.

EXHIBIT 13

Statement of Dr. Hans Weill

* * * * *

In spite of limitations in analysis, making it unlikely that a single cotton dust standard would be equally protective in all mills where multiple factors vary considerably, it is suggested that a level of cotton dust exposure which carries an acceptably low risk of byssinosis will fall between 0.2 and 0.5 milligrams per cubic meter.

* * * * *

EXHIBIT 13A

Report to the American Textile Manufacturers' Institute on a Study entitled Assessment of Respiratory Responses in Textile Workers exposed to Low Levels of Cotton Dust

May 31, 1976

Tulane University School of Medicine

Principal Investigator: Hans Weill, M.D.

Co-investigators: Robert Jones, M.D.; John Diem, Ph.D.; Henry Glindmeyer, M.S.M.E.; V. Dharmarajan, Ph.D; Jean Carr, M.S.

I. Introduction

This study was undertaken to detect the presence of and quantitatively assess any adverse respiratory response to occupational exposure to low levels of cotton dust in the textile industry. While an acute bronchoconstrictor response and its clinical equivalent, byssinosis, have long been associated with cotton dust exposure, opinion differs in regard to the dose-response relationships at the lower end of this curve. The practical question concerns the setting of a permissible cotton dust exposure standard which will carry an acceptable risk for the development of byssinosis. This investigation addresses the question of a "safe" cotton dust exposure in regard to clinical and physiologic evidence of an acute bronchoconstrictor response. Biologic effect was measured by questionnaire responses and pulmonary function testing, these determinations being correlated with concurrent measurements of respirable cotton dust in the work place.

Study design was developed to examine the relationship of byssinosis to past levels of dust exposure in the presence of current low level exposure. Mills with similar current low cotton dust levels were selected where there had been different past levels, specifically high, low and

an absence of previous cotton dust exposure in a mill which had converted from non-cotton to cotton processing. It should be emphasized that the selection of the study mills was based on their meeting the criteria of low current dust levels and the described past exposure patterns. These plants undoubtedly represent the best environmental dust control in the industry and are not necessarily representative or typical of industry-wide environmental conditions. A plant having processed only synthetics and wool served as a control. In addition, the effects of smoking and length of cotton dust exposure were examined, particularly in regard to their possible interaction with levels of past and current dust exposure.

II. Research Plan

A. Mills

The study population included employees working in opening through warping in textile mills selected to reflect four types of exposure histories. The mills are identified by Roman numerals I through IV as noted in Table 1. Mill I had been processing cotton for only four years. Mill II had been processing cotton for many years but had only recently achieved satisfactory dust control with resulting concentrations of respirable cotton dust approximating 0.5 milligrams per cubic meter. Mill III consisted of three installations geographically proximate (a, b, c) where dust exposure has been known to be low for approximately ten years. Mill IV has never processed cotton, this mill using only synthetic fibers or wool. All mill employees who had been working for less than one year were excluded from the study. In Mills I, III and IV, the total population of openers through warpers was studied but in Mill II, the population of spinners through twisters was too large, so this segment of the study group was sampled using a simple random sample. In Mill II, therefore, the study population was

heavily weighted toward workers in preparation jobs (through roving) and comprised 74% of Mill II study participants. Fourteen percent of Mill I participants and 45% of Mill III workers studied were employed in preparation jobs. In Mill IV, the control plant, workers who had been employed in the cotton textile industry for over a year at some time in the past were excluded from the study.

B. Study Population

In addition to meeting the above criteria for inclusion in the study, each participant must have been off work for at least 35 hours before being tested prior to the working shift on Monday, and must have worked at least five hours before his post-shift evaluation. The information upon which inclusion was based was obtained from each participant individually as he or she reported for testing. The population defined above consisted of 524 individual potential study participants. Four of these were disqualified because they had not been off work for at least 35 hours and another 26 were unable to participate due to sickness or similar reasons. The non-participation rate was 5.7%. Of the remaining 494 individuals who completed the interview, complete pulmonary function determinations were not available for a variety of reasons, including 54 where their effort was considered sub-maximal. Such poor effort was documented in a variety of ways including "non-repeatability, slow start from the maximum inspiratory position, start at a sub-maximal inspiratory position, and inability to perform the test." The remaining individuals with incomplete pulmonary function tests were excluded for such reasons as an asthma attack, tuberculosis, tooth extraction, upper respiratory infection, or were excluded from the analyses because no dust sampling was performed in the work area of the individual. Complete analyses were performed on the population numbering 418. Details of the study participation by mill is included in Table 1.

C. Methods

1. Questionnaire

The MRC questionnaire modified for detecting byssinosis was administered to each study participant by three trained interviewers either before or after the Monday work shift. Byssinosis was defined using both the Schilling definition and a less stringent one. Chest tightness sometimes on Monday, always on Monday, and on Monday and other working days, was the primary definition of byssinosis. A secondary definition included cough, phlegm, and dyspnea, as well as chest tightness, with similar Monday periodicity. An individual was considered to have chronic byssinosis if he or she did not have Monday chest tightness at the time of the interview but recalled having had this symptom in the past and continued to have respiratory symptoms subsequent to the intermittent complaints indicated. Chronic bronchitis was defined as cough and phlegm on most days for at least three months of the year, for two or more years (MRC definition). Dyspnea was defined as shortness of breath when walking fast or walking up a slight hill.

* * * * *

IV. Biologic Response

A. Clinical Patterns

1. Byssinosis

Of 494 persons interviewed, six had unmeasured dust levels and two had incomplete answers regarding Monday chest tightness, leaving 486 for analysis of byssinosis prevalence. Table 7 shows characteristics of this study population for each mill. Byssinosis was defined as chest tightness or difficult breathing occurring on the first day back at work after days off, and abating later in the work week. This questionnaire response was given by 22 of 386 cotton workers (5.7%) and three of 100 workers in the synthetic textile (control) mill. The

response rates for each mill, exposure and smoking category are shown in Table 8.

Each cotton worker was assigned to one of three exposure categories according to the measured levels of elutriated dust in his work area. These levels were: high, 0.5 mg/m^3, or greater; intermediate, less than 0.5 but at least 0.2 mg/m^3; and low, less than 0.2 mg/m^3. Subjects who had ever regularly smoked cigarettes were considered "smokers", and all others were "non-smokers".

Questionnaire data was then analyzed using hierarchical log-linear modeling assuming that the number of study participants in each mill-exposure level-smoking category was fixed by design. Evidence of a dose-response relationship was sought by comparing prevalences of byssinosis in the four exposure categories (three cotton and one control). Table 9 shows the observed rate for each exposure level, followed by an estimated rate shown in parentheses. These estimated rates were derived from a log-linar model that specified dependence ($p = .56$ for goodness of fit as measured by -2 log likelihood ratio statistic) on exposure level and smoking, without interaction between these variables. In this analysis the prevalence of byssinosis is significantly ($p = .005$) affected by exposure level beyond the effect of smoking status.

The above analysis, however, proceeds on the assumption that given dust levels define homogeneous exposure level categories, and disregards potential effects of the individual mills. This type of analysis has been used in most of the published studies of dust exposure and byssinosis prevalence, and may be appropriate where prevalence rates are similar in the individual mills. In the present study, the prevalence rates for the mills are: Mill I, 1.1%; Mill II, 15.3%; Mill III, 1.6%; and Mill IV, 3.0%. Clearly, Mill II has a substantial effect upon byssinosis rate, and this effect cannot be ignored in analyzing the dose-response relationship.

* * * * *

Table 8

Byssinosis in Cotton and Control Textile Workers

Cotton Workers

Exposure level (mg/m^3)	High ≥ 0.5		Intermediate $<0.5, \geq 0.2$		Low <0.2	
Chest tightness:	Yes	No	Yes	No	Yes	No
Smokers, Mill I:	0	12	1	33	0	1
" Mill II:	14	55	1	9	-	-
" Mill III:	1	22	1	45	1	46
Nonsmokers, Mill I:	0	16	0	22	0	4
" Mill II:	2	22	1	14	-	-
" Mill III	0	16	0	19	0	28

Control Workers

Chest tightness:	Yes	No
Smokers	1	37
Nonsmokers	2	60

Table 9

Observed Prevalences and Estimated Rates of Byssinosis
by Exposure Level (In Parentheses)

	Cotton			Control
	High ($\geq$ 0.5 mg/m^3)	Intermediate ($<$ 0.5 and $\geq$ 0.2)	Low ($<$ 0.2)	
Smokers	14.4% (13.5)	3.3 (3.6)	2.1 (1.7)	2.6 (4.9)
Nonsmokers	3.6 (5.3)	1.8 (1.3)	0 (0.6)	3.2 (1.8)

EXHIBIT 15

Respirator Testimony for the Proposed Cotton Dust Standard

by

Bruce J. Held, CSP
Livermore, California

I. PERSONAL QUALIFICATIONS

I am Bruce J. Held with the University of California's Lawrence Livermore Laboratory. I will be discussing the respirator requirements in the proposed cotton dust standard.

My background includes a Master's Degree in Industrial Health from the University of Michigan and 20 years experience in Industrial Hygiene. In addition to 15 years as a field industrial hygienist in industry, I was the Leader of the Respirator Research and Development Section, and later the Assistant Group Leader for all industrial hygiene research and development work, including respirators at the University of California's Los Alamos Scientific Laboratory in New Mexico from 1972 through 1974. I am now the Project Leader for respirator research at the Lawrence Livermore Laboratory of the University of California. I have been a member of the American Industrial Hygiene Association since 1959 and on the Board of Directors from 1971 to 1974. I am a Certified Safety Professional, a Director on the Board of Certified Safety Professionals since 1974, currently Vice President of the Board and Chairman of its Examination Committee.

My work in respiratory protection includes authoring or coauthoring over a dozen papers on respirator research, authoring or coauthoring six books and chapters of books on respirators, member of the Joint American Industrial Hygiene Association—American Conference of Governmental Industrial

Hygienists Respirator Committee for 12 years and Chairman from 1972 to 1975, Chairman of the Atomic Energy Commission Respirator Advisory Committee in 1973 and 1974, member of the American National Standards Institute Subcommittee Z88.2 to rewrite the Standard, "Practices for Respiratory Protection," and a consultant to NIOSH and OSHA on the respirator portions of several criteria documents and proposed standards, respectively. Appended to this testimony is a detailed statement of my professional qualifications.

II. LIMITATIONS OF RESPIRATORY PROTECTIVE DEVICES

I would first like to reemphasize the desirability of controlling exposures to cotton dust by means of engineering methods. Respiratory protective devices have many limitations which make them undesirable if engineering controls are at all possible. Among the limitations of respirators are:

A. Fitting problems with persons with small faces such as many women, with persons with facial hair, such as beards or long sideburns, scars or growths which break the facepiece-to-face seal and with persons with pronounced wrinkling, a sunken nose bridge, deeply cleft chin, very narrow nose, a very wide or very narrow face, or very long or very short face.

B. Communications problems between workers wearing respirators. Any respirator will muffle voice communications to varying degrees. With many devices, the jaw movements used for speaking can break the facepiece-to-face seal and cause inleakage of contaminated air.

C. Vision problems can be numerous. Downward vision is obstructed with half or full-face masks, thus increasing tripping or stumbling possibilities. The inability to look straight down could easily cause a serious injury. Full-face respira-

tors will restrict the wearer to tunnel vision. Persons who must wear prescription glasses must be fitted with special glass kits for full-face masks, as the temples of regular glasses break the facepiece-to-face seal. Some persons also have problems wearing glasses with half-masks, as the respirator either pushes the glasses above the eyes or the glasses come between the mask and the face around the nose, thus breaking the facepiece-to-face seal.

C. Fatigue and reduced efficiency occur more quickly among workers wearing any type of covering over the face or head. This is caused by many factors, among them being increased breathing resistance, heat, some possible feelings of anxiety from being closed in and reduced vision. On many jobs we have permitted or required 15 minute breaks every one or two hours while wearing a respirator, rather than the usual one coffee break in the morning and one in the afternoon.

D. Some persons, for reasons of health, would not be permitted to work if they had to wear a respirator. A person with a heart problem may not be able, for example, to wear a 30 or 35 pound self-contained breathing apparatus. Persons with some lung problems such as emphysema may not be able to stand the increased breathing resistance inherent in any respirator.

For these reasons and others which I did not enumerate, it must be emphasized that respirators are a second line of defense, to be used only when engineering controls are not feasible. In other words, respirators are cumbersome, expensive, reduce worker efficiency and may create hazardous situations to a worker and I fully concur with the limitations put on the use of respirators in paragraph (F) of the proposed standard.

* * * * *

EXHIBIT 16

Research Triangle Institute, Technological Feasibility and Economic Impact of Regulations for Cotton Dust

* * * * *

III. *Technological Feasibility*

A major part of the effort of RTI's study was devoted to assessing the feasibility of implementing each section of the proposed standard. There was little difficulty in establishing the feasibility of the provisions for medical surveillance and workplace monitoring. The technological feasibility of alternative methods of providing protection for workers at various exposure limits was much more difficult to determine. RTI's approach to these problems was essentially as follows.

Two steps were taken at the outset: first, to obtain a description of the production processes involved in each of the industry sectors to be studied so that the sources of dust could be determined, and second, to search the published literature for data and analyses of dust controls applicable to cotton processing. It was apparent quickly that some data related to the production of cotton yarn were available, but that data on other cotton processing operations were limited or almost nonexistent.

Studies of yarn manufacturing indicated that cotton dust is generated at each step in the process, but that dust levels in the rooms where these processes were carried on were progressively lower at each step. Thus, the dust levels reported tended to be above 1.0 mg/m^3 for opening, picking, and carding, between 0.5 and 1.0 mg/m^3 for drawing and roving, and between 0.2 and 0.5 mg/m^3 for spinning, winding and twisting. Depending therefore on the exposure limit under consideration, dust controls would be required on some or all of these operations. Much higher dust levels were indicated for clean-up operations, including blow-down of machines and sweeping, and also for the waste room.

Studies of other segments of the cotton industry indicated dust levels requiring control under the proposed standard for the following processes: the gin stand and bale press for cotton gins; the seed house and the delinter for cottonseed oil mills; slashing and warping, and weaving in weaving mills; the garnetting room in cotton batting production; and on all steps from opening to winding in the production of yarn and felt from waste.

At this point in the study, it was apparent that published data would permit identification of dust sources and existing dust levels in the industry sectors mentioned above, but at least two important segments, knitting and carpet manufacturing, were not covered. Subsequent inquiry of industry sources failed to fill this gap in the data and it was decided to exclude these two industry sectors from the study.

It is OSHA policy to prescribe the use of engineering controls to achieve designated worker exposure limits to the extent that they are feasible. If engineering controls cannot reduce dust levels to the prescribed levels, they are then to be supplemented by required work practices that reduce exposure to dust and, if necessary, personal protective equipment (respirators) are also required. RTI has followed this control hierarchy throughout the study.

Engineering controls may be defined as methods designed to collect and remove dust from the air, either by capturing the dust at its source or through general ventilation and air filtration. They also include modifications of production equipment and procedures to reduce dust emissions, and substitution of materials to reduce or eliminate the toxic components of emitted dust. Engineering controls may be retrofitted onto existing equipment or built into new equipment.

Engineering controls of the dust levels in rooms containing any of the above production processes tend to

employ general room ventilation with filtration of the recirculated air, and local exhaust ventilation, again with the air filtered and recirculated. All yarn mills and most other cotton processing establishments, except gins, are air conditioned, with the air recirculated and supplemented by a limited amount of make-up air as needed. Although some filtration is built into any air conditioning system, these systems have not in the past been designed to maintain very low dust levels. Their dust removal efficiency can be enhanced by the installation of multistage filtration systems, but where the dust sources are substantial, achievement of room dust levels in the range under consideration for this standard requires the application of local exhaust ventilation (LEV) as well. Although RTI did not undertake the design and testing of LEV systems, the discussion in the next section on the design principles utilized may clarify the nature of these controls.

* * * * *

On the other hand, the existing regulation specifies an exposure limit of 1.0 mg/m^3, 8-hour time weighted average. The costs related to compliance with exposure limits of 0.5, 0.2, and 0.1 mg/m^3 were calculated as the increased cost required to achieve those levels, starting from a system of controls that would already maintain dust levels at or below 1.0 mg/m^3. Each cost figure given represents the increment required above the costs at the 1.0 mg/m^3 limit. In other words, the costs estimated for compliance at the 0.2 mg/m^3 exposure limit, for example, are incremental over the cost of compliance with the 1.0 mg/m^3 limit, not the increment required to go from 0.5 mg/m^3 to 0.2 mg/m^3. These estimates are not based on the assumption of step-wise compliance with increasingly stringent standards over time.

* * * * *

The capital (installed) costs of engineering controls for use in the yarn producing sector were calculated for

systems to provide room dust levels in compliance with exposure limits of 0.5, 0.2, and 0.1 mg/m^3. These are shown in Table 7, along with the corresponding maintenance and operation, energy, and labor costs, by unit of equipment used in yarn production. Similar estimates were made, to the extent possible, for other industry sectors and these will be discussed subsequently. Tracing our analysis of yarn industry costs will serve to illustrate the methods used throughout.

Estimation of these costs by unit of equipment provided the basis for projecting costs by SIC classification, which was necessary for analysis of economic impact. To make the transition from individual machine cost to industry cost it was necessary to estimate the number of machines in use to produce cotton yarn. Unfortunately, no inventory of cotton textile machinery showing the necessary detail was available. Aggregate data for some equipment types were available from a census study in 1973 and these were combined with information reported by the American Textile Manufacturers Institute covering 1972 or 1973 and related in turn to data on cotton consumption to estimate the number of machines in use.

Textile equipment was divided between cotton and other fiber processing on the assumption that 55.1 percent of the machines process cotton only and 31.5 percent process blends of cotton and synthetic fiber that average 50 percent cotton. This follows an industry division reported by ATMI in 1973 for spinning spindles and was assumed to apply to other equipment equally.

The available data indicated fairly certainly the number of chute-fed and conventional cards in use. Using other data from various sources, a model of the combinations of machines used in typical configurations was developed. Thus, it was assumed that an opening system consisted of three blending hoppers serving a picker. In turn, three pickers were assumed to be associated with each opening system employing pickers. An additional

number of opening systems was assumed for systems with direct chute feed to the card. These ratios were applied to the estimated number of pickers in use and the estimated number of cards in use provided an estimate of the number of opening systems and components, which was apportioned by fiber type processed. In the same way, the numbers of drawing frames, combers, rovers, and open-end and ring spinning frames were estimated. These estimates were combined with estimates of the flow of cotton through the production system, divided by type of operation employed, as shown in Figure 4. Machine costs per pound of cotton processed could then be allocated to estimate aggregate costs.

In this way a model representative of the average firm was developed and the cost per firm estimated. When multiplied by the number of firms in the yarn industry, this helped to estimate industry cost by SIC. It is important, at this point, to emphasize that the model plant is just that, and not a representation of any actual firm. Plant configurations differ considerably from one firm to another depending on the brand of equipment used, the type of product produced, and the quality of cotton processed. RTI did not have an accurate inventory of each type of machine now in use or of the plant configurations. Numbers of machines in use were estimated on the basis of productivity and quantity of cotton processed in a year. They differ then depending on the base year used, as in Table 8. Some degree of error may have been introduced by the estimation process used, but it is felt that the estimates given are a reasonably accurate representation of the expected cost.

Similar analysis was made of each of the other industry sectors covered. Costs were then aggregated and annualized in the subsequent analysis of economic impact. Total initial and recurring (annual operating and maintenance) costs for yarn producers are shown in Table 8.

* * * * *

G. *Implementation*

In the course of this study RTI alerted OSHA to some of the difficulties that the cotton textile industry might encounter in complying with the proposed standard. Two factors, in particular, were identified: (1) the development, production, and installation of control equipment by the control industry, and (2) the ability of textile firms to finance the capital investments required. Neither of these is completely intractable given enough time.

Estimates of the time required for the cotton textile industry to come into compliance with the proposed standard cannot be made with certainty. A large number of firms are involved and each one will have special conditions constraining its actions. Nevertheless, after consultation with textile firms and suppliers of control equipment, and consideration of normal business practices and the experiences of other industries, RTI suggested that compliance by the yarn producing sector with an exposure limit of 200 $\mu g/m^3$ would, it was estimated, take as much as eight or more years. For other sectors of the cotton textile industry, RTI estimated that compliance at each exposure level could require two to three years more than for yarn producers.

The primary basis for these estimates was the problems the control industry may have in supplying required equipment. Each installation will tend to be a custom design for that plant and at best there will be considerable time required to complete and test the installation. For some equipment, also, entirely new designs will be needed and such new technological applications will not be available immediately, even though the general methods to be used are known.

Financing will also be a problem for many firms. RTI was not able to estimate the extent of this problem since detailed financial information for each firm is not available.

Implementation of the proposed standard will require adjustments within the cotton textile industry that will take time to work themselves out and that may be difficult for many firms. In time, however, prices may be expected to rise and markets to adjust so that revenues will cover costs. Although the impact on any one firm cannot be specified in advance, nothing in the RTI study indicates that the cotton textile industry as a whole will be seriously threatened by the impact of the proposed standard for control of cotton dust exposure.

EXHIBIT 26

Memorandum to Grover C. Wrenn from Dr. James A. Merchant

SUBJECT: Review of Draft Proposal for Cotton Dust Standard

* * * * *

Throughout the document byssinosis *incidence*, rather than *prevalence* is discussed. In every case, *prevalence* rather than *incidence* is the correct designation as the data collected was cross-sectional in nature rather than longitudinal.

* * * * *

EXHIBIT 38A

Statement of Edward J. Baier

* * * * *

Occupational exposure to cotton dust was high on the NIOSH list of priorities and was the subject of one of the first criteria documents issued. The cotton dust criteria document (Appendix 1), was transmitted to the Occupational Safety and Health Administration in September, 1974 and recognized that there were significant gaps in the etiology of byssinosis and that there was no definitive environmental level which would assure complete health protection for exposed workers. For these reasons the thrust of the criteria document was for medical management and surveillance of workers *combined* with implementation of engineering controls and work practices to limit worker exposure to the lowest level feasible. In December 1974, NIOSH clarified the term "lowest feasible limit" and recommended that this limit should not be higher than 0.2 mg lint-free cotton dust per cubic meter of air but concluded that even at this level byssinosis would occur among exposed workers. (Appendix 12)

* * * * *

MEDICAL SURVEILLANCE

Because it is well recognized that byssinosis and other biological effects occur at dust levels below 0.2 mg/m3, it is mandatory that an effective medical surveillance program be an integral part of this standard. Conversely, without good environmental control, an effective medical surveillance program is not possible; that is only a small proportion of workers can be effectively reassigned. Clearly a surveillance program without the means to transfer affected workers is ineffective. Therefore, the proposed rules must address not only methods of surveillance, but criteria for the management of affected workers.

* * * * *

EXHIBIT 38D

Merchant, "Epidemiological Studies of Respiratory Disease Among Cotton Textile Workers"

* * * * *

Cross-sectional studies of American cotton textile workers[6,21,33,34,49,51] have established that respiratory disease is common among workers exposed to cotton dust and similar in magnitude and distribution to that previously observed in the British cotton textile industry.[17,32,41,45,46] At the time the present study was begun, there was a need to better define the extent and specificity of pulmonary disease in a large population over a wide range of textile processes and dust levels, particularly in the rapidly expanding cotton/synthetic blend industry. New dust sampling techniques were under development[26] which promised to provide a simple and reliable method for determining lint free dust levels, but needed field testing and correlation with biological parameters of pulmonary dysfunction. Objective measurement of pulmonary function before and after exposure to vegetable dusts was known to produce both acute[10,27] and chronic declines[5,7,9] in ventilatory capacity, but had not been evaluated in a sufficienty large cotton textile population together with an appropriate control population. Few previous studies of respiratory disease in textile workers[14,41] had contained enough subjects to allow for estimation of risk factors relative to measures of respiratory dysfunction. Vegetable dust concentration, when crudely defined by work area [14,33,41] or measured quantitatively,[1,2,41,45] was known to be an important factor in determining byssinosis prevalence and acute decrement in ventilatory capacity. Available data suggested that smoking also affected byssinosis prevalence[14,48] as well as bronchitis prevalence and ventilatory capacity, and that vegetable dust exposure and smoking might interact to produce more severe pulmonary effects.[28,33] Further investigation

was needed to better define these relationships on respiratory disease prevalence and ventilatory function while accounting for other factors such as age, sex, and duration of dust exposure.

Accordingly, a study was designed with three primary objectives. First, to establish the prevalence of byssinosis and other respiratory diseases under diverse working conditions representative of those common to the primary U.S. textile industry. Secondly, to evaluate the vertical elutriator cotton dust sampler[26] as a method to determine lint free dust levels and develop dose-response relationships to help formulate a target toward which environmental control could be directed. Thirdly, to evaluate risk factors and their possible interactions associated with pulmonary dysfunction among textile workers. Byssinosis prevalence and Monday decrement in ventilatory capacity relative to lint free dust levels as determined in this study have been subjects of previous communications.[34,35] The purpose of the present communication is to describe analyses of determinants of respiratory disease, specifically byssinosis, bronchitis and dyspnea prevalence, and four measures of ventilatory function, forced vital capacity in one second ($FEV_{1.0}$), change in $FEV_{1.0}$ with dust exposure ($\triangle FEV_{1.0}$), forced vital capacity (FVC), and change in FVC with dust exposure ($\triangle FVC$).

* * * * *

It must be stressed that the cross-sectional nature of this study dictates that the probability (P) determined in these analyses is the probability that a subject has the disease at the time of observation, rather than the probability of developing the disease. Significant variables used to determine P were selected by accepting those that provided a partial F greater than 3.84 which is the 95th percentile of an F distribution with one numerator and infinite denominator degrees of freedom. Using this criteria, the sets of variables that best dis-

criminated between the presence or absence of byssinosis and bronchitis were determined. Using these linear discriminant functions, subjects were classified by whether they were predicted to have and by whether they were actually observed to have byssinosis or bronchitis allowing calculation of the respective sensitivity and specificity of the functions. As an estimation of the goodness-of-fit of the linear discriminant function, subjects were categorized into deciles of decreasing risk. The expected number of cases was then compared to the number of observed cases.

* * * * *

EXHIBIT 39

Morgan, *et al.*, "Report on Survey on Prevalence of Byssinosis and Respiratory Symptoms in Three Textile Mills"

INTRODUCTION

At the request of Burlington Industries, the Division of Pulmonary Diseases of the University of West Virginia carried out a survey of the prevalence of respiratory symptoms and byssinosis in three mills. The mills were situated in Brighton Georgia, Clinchfield, near Marion North Carolina and at Ranlo near Gastonia North Carolina. The first two both use cotton fiber while the third one only uses synthetic fiber.

Each participating subject had a respiratory symptoms questionnaire administered to them, the latter being based on the British M.R.C. questionnaire. Schilling's additional questions concerning the symptoms of byssinosis were also included.[1] Participation was voluntary. Spirometry was used to determine ventilatory capacity and was administered both before and after a shift. At least four forced expiratory volume maneuvers were recorded on a Jones Pulmonor. When the tracings were not reproducible, additional forced expiratory volume maneuvers were performed. More precise details of methodology are given later in the section of the report dealing with ventilatory capacity.

It will be observed that in some instances disparities exist between the number of subjects completing the questionnaire and those undergoing pulmonary function testing. While the questionnaire was administered at the worker's convenience any time throughout the working week, the pulmonary function tests had to be done in a short period prior to beginning work and then again at the end of the shift. Owing to the large number of subjects being tested, in some instances, workers became impatient when required to wait for more than a few

minutes and left prior to being tested. This was especially true at the end of the shift. In other instances, workers attended once only for their spirometric measurements. In carrying out the spirometric assessment of ventilatory capacity, every effort was made to include as many as posible of the card room workers and spinners with the result that a significantly greater percentage of workers completed this part of the examination.

Measurements of ventilatory capacity were accepted as valid only when the three largest forced vital capacities (FVCs) and the three largest forced expiratory volumes in one second (FEV_1) were all within 10% of each other. These criteria were used in order to insure adequate quality control. All measured values were compared to the predicted values of Morris and co-workers.[2] In this regard, it must be borne in mind that the nomogram derived by the above workers was base on a population of non-smokers and as a result the predicted values are somewhat higher than those of Kory et al.[3]

Prevalence of Byssinosis and Other Respiratory Symptoms by Questionnaire

The standard MRC questionnaire on Respiratory Symptoms was administered to all subjects who agreed to participate in the survey. In addition to the standard questions on respiratory symptoms, Schilling's supplementary questions were administered in order to ascertain the prevalence of the various grades of byssinosis. The severity of byssinosis was graded as follows:

Grade ½. Occasional chest tightness on Monday or the first day of the week.

Grade 1. Regular chest tightness or difficulty breathing on the first day that work was resumed.

Grade 2. Chest tightness and difficulty breathing not only on Monday, but on other days of the week.

The questionnaire was administered by 6 persons of whom two were pulmonary function technicians, one a physician, and three medical students. All persons administering their Questionnaires had been trained and instructed in its use according to the instructions published by the MRC.[4]

Prevalence of Byssinosis

Of the 271 subjects to whom the Questionnaire was administered in Mill B, one admitted to the symptoms of byssinosis (Table 1). At the second mill (C), again two subjects out of the 449 to whom the Questionnaire was administered complained of chest tightness (Table 2). In the third mill (R) in which only synthetic fiber is used, again one subject out of the 240 who completed the Questionnaire stated that he had symptoms of byssinosis (Table 3).

Shortness of Breath

Breathlessness was graded from 1 to 4 by the following criteria. If the subject was troubled by shortness of breath when hurrying on level ground or walking up a slight hill, this was graded as 1. Grade 2 was present when the subject was short of breath walking with other people of his own age at an ordinary pace on level ground. Should the person have to stop for breath when walking at his own pace on level ground, this was graded at 3. Shortness of breath upon washing or dressing was graded as 4.

The prevalence of shortness of breath by grade in Mill B is shown in Table 4. 55 out of the 246 (22%) card room workers complained of some degree of shortness of breath. Corresponding figures for Mill C are shown in Table 5. There 11 out of 41 (26%) of card room workers complained of some degree of shortness of breath. In the spinning room 12 out of 81 (14.8%) had some shortness

of breath, while in the weaving room 31 out of 183 (16%) admitted to this symptom.

In Mill (R) 10 out of 47 (21%) of the card room workers admitted to shortness of breath (Table 6). The corresponding figures for the winding and spinning rooms were 23 out of 70 (32.8%) and 20 out of 51 (39%).

* * * * *

The Relationship of Shortness of Breath to Byssinosis and Cigarette Smoking

The relationship between byssinosis and shortness of breath is shown in Tables 10, 11, and 12. No obvious correlation is apparent because of the paucity of subjects with the symptoms of byssinosis. For the most part, it is evident that there is a clear cut association between shortness of breath and cigarette smoking.

The smoking habits of the millworkers according to their job and workplace are shown in Table 16, 17 and 18.

* * * * *

Conclusions

In all three mills there was a very low prevalence of byssinosis; indeed there was only one subject in Mill B and two in Mill C who admitted to symptoms of chest tightness. Similarly the prevalence and severity of shortness of breath did not differ between the three mills, nor was this symptom any more prevalent in the cardroom workers. A significant number of subjects had a reduced ventilatory capacity, but this appeared to be associated with cigarette smoking rather than exposure to cotton dust. It is concluded that byssinosis is distinctly uncommon in the workers examined and does not constitute a significant hazard in these three groups of millworkers.

EXHIBIT 39A

Supplemental Submission to Statement and Testimony of W. K. C. Morgan, M.D.

The data and information contained herein is made as a supplement to the oral testimony given at the hearings on the Proposed Cotton Dust Standard on April 20 and 21, 1977 (Transcript, pp. 1351-1373, 1424-1512), to the written statement submitted on April 1, 1977 (Exhibit No. 40) for the record as part of the American Textile Manufacturers Institute, Inc. presentation and to the study submitted during the hearing (Exhibit No. 39, Transcript, p. 1424), hereinafter "Study."

During the oral testimony, representatives of various organizations requested that certain data and information be furnished. Information requested, showing the name of the individual making the request and the page of the transcript where the request was made, is as follows:

1. The number of subjects in each of the mills surveyed in the Study who were rejected because their pulmonary function tests, either before or after a shift, did not meet the criteria for reproducibility utilized in the Study were as follows:

Mill B	Mill C	Mill R
59	25	48

In this regard, it must be noted that, in many instances, these subjects' before shift tests met the criteria, but the subjects did not return for an after shift test or the after shift test did not meet the criteria. In such event, the before shift test was used to compare with the subjects predicted value and include in the figures in the appropriate part of the Study. (Ms. Simmons, p. 1428)

2. The questionnaire used in the Study is attached hereto as Attachment "A". (Dr. Merchant, p. 1480)

3. The average or mean age, by sex, of the employees at each of the mills surveyed and who formed the basis for the prevalence rate was as follows:

	Mill B	Mill C	Mill R
Male	37.46	39.46	38.16
Female	38.77	37.16	38.55

(Dr. Merchant, p. 1485)

4. The statistical test utilized to determine the statistical significance of the data in Tables 33 and 34 of the Study was the Students T Test. (Mr. Haymes, p. 1508)

5. The pulmonary function testing was commenced at Mill B on Sunday, January 11, 1976, and on Monday, January 19, 1976, at Mill C. (Ms. Simmons, p. 1425, Dr. Merchant, p. 1476)

EXHIBIT 40

Statement of W.K.C. Morgan, M.D., Professor of Medicine, West Virginia University School of Medicine, Division of Pulmonary Diseases

While the term byssinosis represents a fairly distinct entity to the clinician, its recognition is far from simple and no simple precise definition of the condition can be given. The symptoms of chronic bronchitis and those of byssinosis are similar and, in many instances, it is difficult to unravel the effects of cigarette smoking from those of the inhalation of cotton dust. In various studies, different clinical aspects of the condition have been emphasized. Thus, while some surveys have defined byssinosis in terms of the response to Schilling's modification of the MRC questionnaire (Schilling questionnaire), others have relied on the decrement in ventilatory capacity that occurs over a shift to characterize the condition, while yet others have preferred to look at the overall ventilatory capacity of cotton workers as compared to comparable controls. No doubt all of these manifestations of the condition are important, however, nowhere in the OSHA proposed standard for cotton dust is it clearly stated which of these features of byssinosis the standard has been designed to control. The general impression is left that the adoption of the standard will have equally beneficial effects on all the various features of the condition, despite the fact that the evidence available suggests that the anuual decrement in forced expiratory volume in one second (FEV_1) appears to be unrelated to symptoms of byssinosis, bronchitis or dust levels.[1]

Many of the arguments used in favor of the proposed 200 u/m^3 are based on the prevalence of symptoms as defined by the Schilling questionnaire. Indeed, frequent reference is made to the investigations of Merchant et al.[2,3] and of Molyneux and Tombleson[4] in which the prevalence of byssinosis was related to particular levels of

dust. First, in this context, I feel it is unwise to regard the questionnaire as a precise instrument of mensuration since it is quite clear that the response to the questions varies not only with the interrogator, but the same subject will frequently answer the same question in a different fashion on a different occasion.[5] Thus, personal experience has shown that the prevalence of respiratory symptoms can be doubled or tripled by changing the tone and emphasis of the questions so that a tendentious inflection is given to the manner in which the question is asked. For this reason the MRC of Great Britain has published a monograph giving instructions on the use of their questionnaire.[6] Second, as the document proposing the standard makes clear, the shift decrement in ventilatory capacity is related poorly to the symptoms of byssinosis, viz. chest tightness, etc. Third, the relationship, if any, of an increased annual decrement in FEV_1 and FVO, etc. to a Monday morning shift decrement is unknown and remains conjectural. Clearly any standard should be primarily concerned with preventing a greater than normal annual decrement in ventilatory capacity. To strive by means of an exceptionally stringent standard for the elimination of Grades ½ and 1 as defined by Schilling or the elimination of a non sustained transient drop in the FEV_1 serves little purpose if in doing so the textile industry as a whole is placed economically in jeopardy. In this regard I do not believe at the present time there are sufficient data available to justify the stringent standard proposed by OSHA, an opinion that is based on a recent field study along with a careful consideration of the other available evidence.

At the request of Burlington Industries, the Division of Pulmonary Diseases of the University of West Virginia carried out a survey of the prevalence of respiratory symptoms and byssinosis in three textile mills. The mills were situated in Brighton, Georgia (Mill B);

Clinchfield, North Carolina (Mill C); and Ranlo near Gastonia, North Carolina (Mill R). The first two used cotton fiber while the third processed only synthetic fiber.

Each participating subject had the respiratory symptoms questionnaire of the MRC administered to them along with supplemental questions devised by Schilling. Participation was voluntary. Spirometry was performed before and after a shift. At least four forced expiratory volume maneuvers were recorded on a Jones Pulmonor. When the tracings were not reproducible, additional maneuvers were carried out. Measurements of ventilatory capacity were accepted as valid only when the three largest forced vital capacities (FVCs) and the three largest forced expiratory volumes in one second (FEV_1s) were all within 10 percent of each other. These criteria were used in order to ensure adequate quality control. All measurements were compared to the predicted values of Morris and co-workers.[7] In this regard, it must be borne in mind that the nomograms derived by Morris were based on a population of nonsmokers and, as a result, the predicted values were somewhat higher than those of Kory et al.[8]

PREVALENCE OF BYSSINOSIS AND OTHER RESPIRATORY SYMPTOMS BY QUESTIONNAIRE (TABLES 1-3)

The severity of byssinosis was graded from the questionnaire in the usual fashion. The questionnaire was administered by six persons of whom two were pulmonary function technicians, one a physician and the remaining three medical students. All had been previously trained in administering the questionnaire according to the instructions published by the MRC.

Of the 271 subjects to whom the questionnaire was administered in Mill B, one admitted to the symptoms of

byssinosis (Table 1). In the second mill, two subjects out of the 449 complained of chest tightness (Table 2). In the third mill in which only synthetic fiber was used, only one subject out of the 240 who completed the questionnaire admitted to symptoms of byssinosis (Table 3).

SHORTNESS OF BREATH (TABLES 4-6)

Breathlessness was graded from 1 to 4 by the following criteria: if the subject was troubled by shortness of breath when hurrying on level ground or walking up a slight hill, this was graded as Grade 1. Grade 2 was present when the subject was short of breath when walking with other people of his own age at an ordinary pace on level ground. Should the person have to stop for breath when walking at his own pace on level ground this was graded as Grade 3, and shortness of breath when washing or dressing was graded as 4. The prevalence of shortness of breath by grade in the three mills is shown in Tables 4 through 6. The prevalence of shortness of breath in the card room workers of the three mills was as follows: 22.3% for Mill B, 26.8% for Mill C and 21.2% for Mill R. These figures are not statistically different. There was a clear cut relationship between shortness of breath and cigarette smoking, but owing to the fact that so few subjects had symptoms of byssinosis, it was not possible to show a relationship between the presence of shortness of breath and byssinosis.

* * * * *

In conclusion, there is not enough evidence to justify the proposed stringent standard. Most studies have suggested that there is no threshold level below which no cases of byssinosis will occur. While this concept may be correct, it is not necessarily so, and the attempt to promulgate an excessively low standard in order to reduce the prevalence of byssinosis to almost zero may be doomed to failure. Some of the subjects with byssinosis who are

working in areas where the dust levels are negligible may have developed the condition while working elsewhere, and have subsequently changed their job. Hence, their symptoms could well be a reflection of past rather than present exposure. This situation is more likely to be true for symptoms of byssinosis than it is for a decrement in FEV_1. Symptoms of byssinosis in the absence of a past shift decrement in ventilatory capacity should be viewed with caution.

Next, it is not clear whether the purpose of the proposed standard is to prevent (a) the symptoms of byssinosis, (b) the Monday morning decrement in ventilatory capacity, or (c) to reduce to a normal level the annual decrement in FEV_1 and FVC. Without a clear indication of the effects of the proposed standard on the above manifestations of byssinosis, it would seem wiser to adopt a more pragmatic and liberal approach since this permits a future lowering of the dust level as more information becomes available. A too stringent standard has more serious implications and could lead to serious and permanent economic damage to the industry before the necessary relaxation can be put into effect.

EXHIBIT 41

Statement of Russell A. Harley, M.D., Associate Professor, Department of Pathology, Medical University of South Carolina

I am Russell A. Harley, Associate Professor in the Department of Pathology of the Medical University of South Carolina. Over the past five years in dealing with research projects on byssinosis[1], I have been involved in the identification of subjects to whom that term may appropriately apply. The purposes of these projects have been to seek reactions to well-defined types of cotton dust and to search for evidence of an immunologic reaction in byssinosis. I found it possible to identify some subjects with "byssinosis" with considerable confidence, but in other cases this was difficult. This statement includes observations and conclusions drawn from this experience.

A major problem in dealing with byssinosis has been the variety of conditions included under the term. Definitions range from nebulous transient feelings of discomfort to crippling disease. Logical and appropriate action demands clarity of terminology. Every effort must be made to avoid using the word "byssinosis" without appropriate modifiers.

Consider the following definitions of the term with the words in parenthesis. Some of those terms which have been loosely and carelessly used to describe "byssinosis":

A. *ACUTE BYSSINOTIC REACTION* (byssinosis, acute byssinosis, Monday asthma, reactor state, etc.):

1. *Subjective:* a feeling of chest tightness worse on Mondays or the first day back at work after an absence.

   (a) Grade ½ byssinosis: feeling present on some Mondays.

(b) Grade 1: every Monday but not other days.

(c) Grade 2: Monday and other days.

2. *Objective:* 5% to 10% or greater decrement in FEV_1 (or other objective evidence of bronchoconstriction) worse on Mondays or first day back at work.

B. *CHRONIC OBSTRUCTIVE BYSSINOSIS* (byssinosis, grade 3 byssinosis, byssinosis with disability, etc.): Permanent chronic obstructive pulmonary disease (COPD) occurring as a result of cotton dust exposure.

There are varying degrees of severity of both of these. Grade ½ "byssinosis" is a nebulous entity, probably useful in epidemiologic work, but hardly acceptable as a "disease". Any attempt to estimate the prevalence of the Monday phenomenon, the key criteria for a finding of byssinosis, which utilizes Grade ½ should be regarded with scepticism since many persons not at risk of byssinosis feel the subjective symptoms of shortness of breath or chest tightness on "some Mondays". Data drawn largely from healthy working persons should not be used to imply the presence of massive numbers of *disabled* workers in the textile industry. This is not meant to minimize a very real problem but simply to point out that understanding this problem requires accurate terminology. Likewise, hidden within the term chronic obstructive byssinosis, or Grade 3 byssinosis, is a range of disability from the verge of normalcy to severe disease. When standard tables of predicted pulmonary function data are used in applying the term, some people who *are* normal are included in this category.

Schilling's original classification of byssinosis (Grade ½, 1, 2), a classification of subjective symptoms only, has been a useful tool in some epidemiologic studies.

However, it should be borne in mind that many persons show the functional change of the acute byssinotic reaction but are not aware of it. Thus, from a practical standpoint, objective evidence, e.g., pulmonary function tests, of the acute reactor state has proved much more useful.

Finally, in widely used modifications of the classifications where Grades ½, 1, 2, 3 appear in an orderly sequence, the assumption is often made that the disorder progresses from ½ to 1 to 2 to 3 and, thus, all grades reflect the progress of the individual's disability. In many instances, however, there is no progression at all. Sometimes Grade 3 seems to appear *de novo*, or there is a jump from 1 to 3. Among those who develop permanent disability, Grade 2 very often never occurs.

DIAGNOSIS OF THE ACUTE BYSSINOTIC REACTION

Although subjective data are important and should never be ignored, my experience, and those of others, has shown that objective criteria are most useful in making this diagnosis. A standard questionnaire is a useful tool in identifying probable reactors and if taken together with objective data such as pulmonary function tests should lead to a more careful medical history.

It must be noted, however, that many instances of what appears to be acute byssinotic reaction on an objective basis will disappear upon subsequent retesting. The original decrement may be associated with a cold, for example, or other condition which the examiner has neglected to note; or is the result of the diurnal variation which is sufficiently great in some individuals that the higher level of FEV_1 is normal for the individual for the time of day at which the original test was made; but in most cases it is simply unexplained. The incidence

of apparent acute reactive byssinosis will frequently drop to half the original number upon subsequent retests. Thus, it is evident the diagnosis of acute byssinotic reaction should not be based on a single examination as is usually done in most epidemiological studies.

The difficulty of diagnosis of the acute byssinotic reaction is, even with these tools, prominent. Bronchial hyperreactivity is well recognized in asthmatics, who are, of course, present everywhere in the general population, and the problem of asthma in the textile industry in our experience is as great or greater than that of byssinosis. The variations in bronchial constriction in asthmatics is generally a prominent feature of their pulmonary function tests and is usually not related to byssinosis. Asthmatics are at great risk of developing disabling lung disease and are not immune to the adverse effects of cotton dust. Determining the onset of the acute byssinotic reaction in the population of asthmatics may be difficult or impossible. Additionally, the development of hypersensitivity to elements in the mill environment may appear and should be watched for carefully. This is not byssinosis but nevertheless is a distinct hazard of this peculiar population which deserves increased attention.

The acute reaction becomes more prominent the longer the subject is away from dust. Many people really notice the feeling of chest tightness only after return from vacation. Return from vacation is a particularly opportune time for pulmonary testing of persons in whom the presence or absence of the reaction is questionable.

Further, many workers prevent or abort the acute reaction by the use of medication. This may be over-the-counter self medication or may be medication prescribed by a physician. This is a point which is frequently neglected and needs to be taken into account. The assistance of a qualified allergist in handling persons with hay fever and asthma in the mill situation is often necessary.

Finally, with regard to the symptom of cough, its association with bysinosis is not clear. The cough may be stimulated by the inhalation of cotton dust in byssinotics and non-byssinotics and, of course, occurs in a variety of other conditions including some not primarily related to the lung, e.g., heart disease.

CHRONIC OBSTRUCTIVE BYSSINOSIS

Over many years, the inhalation of cotton dust may result in chronic obstructive lung disease. Excluding asthma, chronic obstructive lung disease generally means chronic bronchitis and/or emphysema.

Chronic bronchitis is a disease involving the airways and is associated with chronic cough and the production of sputum. Such a productive cough is frequently found in persons with chronic obstructive byssinosis, but this is especially true in smokers. Chronic bronchitis is most commonly caused by cigarete smoking, viral infections, or chemical fumes.

Cigarette smoking may also result in certain forms of emphysema. Emphysema may, however, occur in the absence of cigarete smoking or chronic bronchitis and in such cases is sometimes associated with a congenital blood protein deficiency (alpha-1 antitrypsin deficiency). In circumstances where chronic obstructive byssinosis is not associated with a productive cough, the site of involvement in the respiratory tract is probably either in the small airways or in the alveoli. Involvement of the alveoli would probably be in the form of pulmonary emphysema, a disease in which alveoli are hyperinflated and disrupted.

Chronic obstructive lung disease caused by inhalation of cotton dust (chronic obstructive byssinosis) may occur independently or may be superimposed upon chronic bronchitis and/or emphysema of other etiology. In our

experience, most cases of disabling chronic obstructive lung disease in persons with byssinosis appears to be caused by a combination of cigarette smoking and inhalation of cotton dust. In some instances, it is virtually impossible to say what part was played by the various offending agents. In other cases, a careful history will tend to incriminate one factor more than another, and in this respect, it will be found that cigarette smoking is responsible for more lung disease in textile mills than is cotton dust.

The precise pathology of chronic obstructive byssinosis is not yet known. Likewise, the pathology underlying the acute reaction is not yet clear. A major reason for the lack of knowledge concerning the basic nature of these conditions has been a poor understanding of their symptoms among the medical community. This fault is rapidly being corrected, but at present the medical personnel having the most direct experience and understanding of practical aspects of the problem are the physicians employed by some of the larger textile companies.

* * * * *

The danger from inhaling cotton dust is not the same type or degree of inhalation of inorganic dusts such as silica, asbestos, etc. These latter substances cause fibrosis and result in a small, scarred lung with restrictive disease, quite the opposite of chronic obstructive byssinosis. Finally, there is no evidence that byssinosis is related to cancer as are asbestosis and tobacco smoking.

* * * * *

The degree of reversibility of chronic obstructive byssinosis (stage 3 byssinosis) has yet to be thoroughly examined, even in prospective studies such as that of Berry, Molyneux and Tombleson.[2]

ABNORMAL PULMONARY FUNCTION VALUES IN OTHERWISE NORMAL PERSONS

Although I have emphasized the importance of the pulmonary function tests in the proper diagnosis of the acute byssinotic reaction and chronic obstructive byssinosis, it must be recognized, lest people be badly misled, regarding the use of test data that a significant percentage of textile employees with no evidence of byssinosis or other respiratory disease by history, physical examination, or X-ray will have abnormally low vital capacities and FEV_1 values. These include the following groups:

(1) Certain of the black population, especially tall, thin, black males.

(2) Overweight and middle aged or older females with small muscle mass.

(3) Others (e.g., persons with physical deformities of the upper respiratory tract, nose and mouth, etc.).

* * * * *

In the absence of a clear, scientifically proved link between the Schilling grades (½, 1, 2) and permanent disability, a matter of priorities arises. One assumes that the objective of the expenditure of money and energy by the textile industry should be the complete and absolute prevention of permanent disability (chronic obstructive byssinosis) among its employees. The total elimination of the reversible and often unnoticed acute reaction is clearly a second priority item. Discomfort from this reversible reaction can and should be eliminated, but a mild drop in FEV_1 on Monday unnoticed by the worker should simply serve notice to the medical personnel that this person may be at increased risk of developing COPD. The employee should, of course, be retested several times to document the reliability of this datum.

An adequate medical surveillance program combined with reasonable dust control and good work practices can prevent new cases of chronic obstructive byssinosis and progress of existing acute byssinotic reaction as a problem among the textile worker population. Dust control alone cannot eliminate the problem. Emphasis in terms of energy and money should be toward solving the problem. The problem is byssinosis, not simply dust. If the emphasis on dust is too great, that on byssinosis will be too small. Byssinosis has been recognized in this country for long enough so the problems associated with it should not be put aside while arguments about dust continue. A realistically achievable level should be chosen, complied with, and the medical problem, which will be a continuing one, successfully met.

EXHIBIT NO. 43

Annual Cotton Dust Survey

Summary 1976

Brighton Plant

Location	Material	mg/m³ Respirable	mg/m³ Total
OPENING #1	Cotton	0.68	0.45
OPENING #2	Synthetic	0.31	0.53
OPENING #3	Synthetic	1.91	4.00
PICKING #1	Cotton	0.86	1.24
PICKING #2	Synthetic	0.24	0.34
PICKING #3	Cotton	0.12	0.28
CARDING #1	Synthetic	0.18	0.32
CARDING #2	Synthetic	0.16	0.32
CARDING #3	Cotton	0.64	1.34
CARDING #4	Synthetic	0.20	0.52
CARDING #5	Synthetic	0.30	0.44
DRAWING #1	Blend	0.16	0.46
DRAWING #2	Blend	0.23	1.01
DRAWING #3	Blend	0.27	0.57
DRAWING #4	Blend	0.50	0.60
COMBING #1	Blend	0.70	0.55
COMBING #2	Blend	0.30	0.30
ROVING #1	Blend	0.28	0.34
ROVING #2	Blend	0.22	0.41
ROVING #3	Blend	0.12	0.34
SPINNING #1	Blend	0.17	0.45
SPINNING #2	Blend	0.16	0.45
WINDING	Blend	0.18	0.46
TWISTING	Blend	0.25	0.41
SPOOLING	Blend	0.26	0.29
WASTEHOUSE		0.30	0.38

Annual Cotton Dust Survey
Summary 1976

Clinchfield Plant

Location	Material	Respirable mg/m³ 1975	Respirable mg/m³ 1976	Total mg/m³ 1975	Total mg/m³ 1976
OPENING #1	All Cotton	1.16	0.76	2.04	1.17
OPENING #2	Cotton and Synthetic	0.91	0.58	1.32	0.58
PICKING	Cotton and Synthetic	0.25	0.16	0.36	0.24
CARDING	Cotton and Synthetic	0.57	1.04	0.86	1.83
DRAWING	Blend	0.39	0.34	0.48	0.65
COMBING	Blend	0.72	0.48	0.85	0.69
ROVING	Blend	0.10	0.11	0.46	0.34
SPINNING	Blend	0.07	0.17	0.27	0.42
SPOOLING	Blend	0.17	0.27	0.18	0.34
WASTEHOUSE		0.37	0.38	1.20	0.62

There was a survey made November, 1975, and this was a supplementary survey for the University of West Virginia Pulmonary study.

EXHIBIT 47b

Supplemental Submission to Statement and Testimony of Harold R. Imbus, M.D., Sc.D. Medical Director Burlington Industries, Inc.

The data and information contained herein is made as a supplement to the oral testimony given at the hearings on the Proposed Cotton Dust Standard on April 22 and 25, 1977 (Transcript, pp. 1844-1954), to the written statement submitted on April 1, 1977 (Exhibit No. 47) for the record as part of the American Textile Manufacturers Institute, Inc., presentation, to the "Annual Cotton Dust Survey for 1976" (Exhibit No. 43) and to the "Appendix" (Exhibit No. 44) to the written statement.

In regard to the information concerning Exhibit No. 43, "Annual Cotton Dust Survey for 1976," the following is furnished:

1. The material or fibers being processed in the "distinct operation areas" at the Brighton and Clinchfield Plants are shown in Attachment "A" which is attached to this Supplemental Submission and should be made part of Exhibit No. 43.
2. Blending of cotton and synthetic fibers is done at both the Brighton and Clinchfield Plants at the drawing operation.
3. No dust level measurements or samples were made in the Weaverooms at either the Brighton or Clinchfield Plants at the time of the study by Dr. W. K. C. Morgan (Exhibit No. 39) on January 11, 12, and 19, 1976.

4. There are no weaving operations at the Ranlo Plant.

5. All dust level measurements or dust sampling at both plants was done by vertical eleutriators.

6. The dust level measurements shown for each "Location" at both the Brighton and Clinchfield Plants are *mean* or average dust levels.

7. The "Location," e.g. Carding #1, shown for the Brighton Plant are "distinct operational areas." The "Locations" are *not* sampling sites. Any attempt to determine mean or median dust levels from the information shown in Exhibit No. 43 is improper, would be totally misleading and completely in error.

8. Opening Location #1 at the Clinchfield Plant processes 100% cotton. Opening Location #2 at the Clinchfield Plant processes, within its confines, both cotton *and* synthetic fibers. The Picking Location at the Clinchfield Plant processes, within its confines, both cotton *and* synthetic fibers.

9. During the period of and prior to the study by Dr. Morgan (Exhibit No. 39), the cotton processed at the Clinchfield Plant was MCSLL, 1-1/16" Memphis and 1-3/32" California.

10. No significant engineering or product changes occurred during the period from 1970 through the date of the study by Dr. Morgan (Exhibit No. 39).

In regard to Exhibit No. 44, attached hereto as Attachment "B" are revised Tables I to IV, inclusive, which reflect *revisions in the calculations* of the information furnished to the American Textile Manufacturers Institute, Inc. by various companies regarding the results of the administration of the questionnaires and the pulmonary function tests in the companies' initial surveys of

employees. The information furnished to the American Textile Manufacturers Institute, Inc. remain unchanged.

Tables I to IV, inclusive, of Attachment "B" should be substituted for the corresponding tables presently in the record as Exhibit No. 44 and the tables presently in the record deleted therefrom.

In view of the revision of the Tables I to IV, inclusive, of Exhibit No. 44 as set forth in Attachment "B" attached hereto, Table II of the written statement, (Exhibit No. 47) has been revised. The revision in Table II of Exhibit No. 47 is attached hereto as Attachment "C". Attachment "C" should also be substituted in the official record in Exhibit No. 47 and the Table II presently contained therein deleted in its entirety.

Information requested in regard to the dust levels at Plant E, Table IV of the submission to Cotton Dust, Proceedings of a Topical Symposium, November 12, 13, 1974, Atlanta, Georgia, entitled "Experience with Medical Surveillance Programs" (Reference No. 57, Fed.Reg. Vol. 41, No. 250, Tuesday, December 28, 1976, p. 56514) is set forth in Attachment "D" which is attached hereto and made a part hereof. All dust level measurements shown in Attachment "D" are measurements obtained by the use of a vertical eleutriator.

* * * * *

EXHIBIT 48

Statement of M. C. Battigelli, M.D.

* * * * *

The central point of equivocation in the OSHA document of December 28, 1976, as well as in several of the evidentiary publications quoted therein, resides in the inadequate criteria of diagnosis of byssinosis. Allow me to state that diagnosis, in medical practice, is the process of recognizing health states and health outcomes in order to define pathological processes, as precisely as possible, for the purpose of medical management and care. In order to assure a minimum of consistency and accuracy, methods of diagnosis require a great deal of uniformity in the application of identification criteria. Epidemiological surveys are not exempted from following rigorously these same procedures and criteria. A diagnosis actually consists of three consecutive and interdependent phases: the gathering of facts (i.e. history, examination, and laboratory tests), the assessments of relative importance and mutual relationships of these facts (diagnostic analysis and interpretation), and finally, distinguishing the correct entity from other diagnostic entities which are similar but not applicable (differential diagnosis).

In the specific example of byssinosis, the entire evidence (the fact, if you wish) is based on a symptoms-complex whose initial history has been clearly captured and unequivocally recorded in over a century of medical literature. The peculiar cyclic behavior of the symptom-complex is that it is present on a given day and it is not on the following day, in spite of identical environmental conditions. Although this is the evidence accepted by all experts in the field, it is only inadequately spelled out in the OSHA document. It should be clearly emphasized that any shortcut in the diagnosis of byssinosis will only

confuse the issue and vastly reduce the value of any measurement obtained on this faulty base. The proof that this occurs is readily provided by the evidence quoted in the OSHA document. When modifications of the Medical Research Council questionnaire are applied, diagnostic precision is seriously reduced, as for example, when critical questions are omitted, such as the omission in the OSHA document of number 8 of the original text [9]: "Do you get this (i.e. tightness or breathlessness) apart from colds?"; and number 10: "Has your chest ever been tight or your breathing difficult on any particular days? If yes, specify: First day back at work only versus other day(s) also."

These questions need to be applied and evaluated diligently, avoiding both omission and stereotyped interpretation. We are dealing here with facts of medical history, complex and crucial information. Any omission of adequate prudence may result in error. Coarser errors may be further encountered in the substitution of a tested questionnaire with a new and untested one where totally arbitrary elements of medical history are introduced, such as inquiring into the presentation of symptoms in a totally different context, and by eliciting complaints related to a pause of a week or ten days, an event, which is not normal on an annual or other basis and of an entirely different connotation and meaning. In this latter regard it must be emphasized that, although questions to elicit complaints related to a pause of a week or ten days have never been contained in any of the different editions of the Medical Research Council questionnaire, such questions are an integral part of Appendix A to the OSHA proposed standard. Reliance on and utilization of such questions can only lead to distortion of medical history and a failure to crystallize the diagnosis. When diagnostic criteria are violated, not only phase one (fact collection), but also phase two (analysis of data and inter-

pretation) and phase three (differential diagnosis) are affected and profoundly biased. The claim introduced in the OSHA document of concurrence of chronic bronchitis, asthma, emphysema, and other non-specific disorders have not been claimed or proven by any study or reports to be the consequence of cotton dust exposure. Similarly, chronic bronchitis has not been demonstrated by any persuasive published report to be either the consequence of or aggravation from cotton dust exposure.

It is indeed readily understandable that the uninformed public may mistakenly trace the cause of common respiratory complaints and difficulties to a factor which has received widespread notoriety, namely cotton dust. In fact, it is not unusual that patients are referred to the specialist's attention, with the putative diagnosis of byssinosis, are actually textile workers involved in operations *not* exposing them to cotton, a most persuasive evidence of this error.

In many studies published the definition of byssinosis presented is arbitrary and imprecise. This occurs when this definition, in fact, is obtained, operationally, through the use of a questionnaire, applied in the course of oversimplified interviews of textile workers. In one of these studies, the following questions were asked [10]:

1. Have you in the past, or do you now, develop a cough at work? (4 points if answer is affirmative and Monday or early part of the week is identified as the specific time of occurence).

2. Have you in the past or do you now develop a tight feeling in your chest while at work? (8 points, as per question 1).

3. Have you in the past or do you now become short of breath at work? (8 points, as per question 1).

4. Is your breathing better when you are away from work? (2 points).

5. Have you in the past or do you now have trouble breathing normally at the beginning of the workweek but find that your breathing improves as the week goes on? (6 points if positive).

Presumptively, in this study a diagnosis of byssinosis is obtained with this instrument automatically, with any score yielding a value of two or better. This can be done with a positive reply to Question 1 and that question only, or to any other question and that question alone. It is obvious that these questions have a much different meanning, weight, and liability to error. Admittedly, a positive reply to Questions 1 through 3 can be obtained from anyone with a history of a single episode (i.e. angina, pneumonia, acute bronchitis, etc.), totally unrelated to byssinosis. There is no differentiation between an episodic occurrence and a more persistent event. There is no evidence in the text of this paper toward attempts to minimize or exclude false positive replies. Question 4 may elicit a positive reply, in turn translated into evidence of byssinosis automatically, when the subject meant dyspnea on exercise or effort. It is a common experience that activity during weekend pauses are, in intensity or perception, lighter and more compatible with feelings of well-being than those faced during the working schedule.

Berry et al. [11] are probably responsible for a similar error, consequence of a faulty interpretation of a questionnaire. Their diagnostic matrix reads as follows:

Byssinosis 1: chest tightness and/or difficulty in breathing on Monday only.

Byssinosis 2: chest tightness and/or difficulty in breathing on Mondays and other days.

The definition of Byssinosis 2 is not adequately incorporated in this formulation. It should rather and unequivocally include historical evidence of Byssinosis 1,

that is, that recurrent difficulty experienced on the first day of exposure, usually disappearing on the following days (none on Tuesday). By the repeated assertions of all the authorities in the field, we understand that this historical evidence is the only characteristic available for this disorder. If this characteristic is neglected, byssinosis would lose any validity as a diagnostic entity or as a goal of diagnostic effort. There is little doubt that these errors have extensively biased the statistical results of several reports.

* * * * *

In summary, estimates of byssinosis prevalence require careful and systematic application of the orthodox definition of the disorder and shortcuts or oversimplification in diagnostic inquiry may result in colossal errors. This unfortunate consequence seems to have occurred in some of the surveys which understandably have received popular recognition. These errors should be avoided, lest the uninformed public, the patient population included, be misled into interpretation and decisions which are unwarranted, possibly becoming a threat to their livelihood.

EXHIBIT 54

"Burlington Industries Took Our Breath Away: Brown Lung Victims Tell Their Stories"

Mrs. Eva Bradshaw

April, 1977.

My name is Eva Bradshaw. I am 61 years old and I worked for 41 years as a spinner in Burlington Industries' Erwin Mills until I had to come out disabled with my lungs at the age of 55.

I want to talk some today about my medical experience and how the company and their doctor Battigelli has done me and then I want to talk about what the mill was like where I worked in the spinning room.

Along about 5 or 10 years before I had to come out of the mill my chest would get so tight it felt just like an accordian that had closed down, like it was squeezed shut as tight as it would go. I coughed all the time, especially at work. And I finally got so short of breath that I couldn't hold out to teach Sunday School that I had taught for 42 years.

The last few years I worked I had about coughed out my stomach lining and I developed a hernia from it. In fact, I had 5 major operations in three years and my doctor said every one of them was coming from that bad cough that I had.

In 1970 it got so bad at work that I couldn't even talk. I have never smoked in my whole life, so I figured it was my heart, this pain in my chest and having a hard time breathing. So I went to a chest specialist in Fayetteville. I never thought that would be the last day I would work; I thought I had ten more years.

She put me in the hospital for 9 days and she told me never to go back in that mill that it had already done me enough harm. She wrote on a paper that "byssinosis was probably present after 41 years in atmosphere of cotton dust."

I didn't know what byssinosis was. Nobody at the mill had ever talked about it and nobody ever told us that cotton dust was bad for us or it could cause a lung disease.

When I put in for my leave at the mill, they sent me a paper to go to Dr. Battigelli in Chapel Hill. He ran me through 3 days of testing and at the end all he said was 'that he couldn't pinpoint it to byssinosis.' And that was the last thing I ever heard about it for six more years, until the Brown Lung Association started educating us about it. I never saw a report from that doctor, the company doctor never talked to me or told me anything.

But just to show how far off that Doctor Battigelli is, I want to tell you what he wrote in my medical record, which I saw for the first time a few months ago when my lawyer got it.

First all he said I was a 65 year old woman, but I was only 55 when he saw me. Then here's how he wrote up my record, to show he had his mind made up: "the patient underwent extensive pulmonary testing *to rule out the possibility of byssinosis.* The pulmonary function tests *are not available* at this dictation." He said he was testing me to *rule out* brown lung, not to see if I had it. And then he didn't even have my test results when he wrote up the report. I guess he didn't need them because he had already made his mind up.

My husband worked in a cotton mill too, for over 50 years and in 1972 he had to come out too. The doctor then said he had "obstructive lung disease, probable bys-

sinosis." But before he ever knew what byssinosis was or even knew about his rights to compensation he died. The last few months of his life he just lived on an oxygen machine and the company told us nothing.

I don't think now that they should be allowed or trusted to educate mill workers about the dust because they won't tell people like they should.

* * * * *

Elsie Temple Morrison

April, 1977

My name is Elsie T. Morrison. I am 51 years old and I worked as a spinner in Erwin-Burlington Mills for 27 years. I'm not able to come and testify because I just got out of the hospital on account of my lungs and breathing.

But I want to tell some things that have happened to me at Burlington mills on account of the cotton dust.

In 1974 I was having to miss a lot of work because of my breathing and finally my doctor put me in the hospital for a week and sent a note to the company to have further tests, that I might have byssinosis. That was probably the first I had ever heard about brown lung. Before they sent me to Dr. Battigelli, my supervisor came and asked me did I want to bid on a job out of the dust. He said the company nurse had come and talked to him about me and said maybe I should get out of the dust since my "breathing had steadily declined over the years."

That kind of upset me, because she had never told *me* my breathing had been going down every year. I took the breathing tests since 1971, sometimes several times a year, and *they never told me anything.* They never said what my breathing was, if it was getting worse, or anything.

Instead of transferring me, they made me bid on a job in the cloth house. I took a pay cut of about $50.00 a week, because I had been making production before. I got to the cloth house, but the fumes in there made it just as hard for me to breathe, so I went back to my spinning job.

Then I got sick again and my doctor had me stay out of work. I was sending my doctor form to the mill every week until I found out they had put me on a year duration leave of absence. They never told *me* that before. At the end of that year, April, 1975, the mill insurance company (Provident) sent me a paper saying I was retired by the mill, *"totally and perm. disabled."* is just the way it read. When I tried to get some disability, because I couldn't work and I had to eat, they turned me down and said I was able to work. So I went to the Unemployment and when they got a statement from the mill they turned around and wrote I had *"voluntarily quit."*

For the last *two years* I have been trying to get some money to live on, and just getting the run-around wherever I go. I have lost *15 years worth of wages* by being disabled to work from my breathing, and the mill hasn't helped me get a thing. They take better care of their machines than their workers.

The mill *never* educated us about the cotton dust. They would call us in and show us movies sometimes about their profits and how good they was doing, and I remember they showed us a film about the earplugs, but they never said the dust was bad for us.

When they started giving the breathing tests in 1971, they never said why they was giving it. Our supervisors just said to come in early one time, that they would give us some tests before we started to work that day. Naturally, rumors got around; some people said it was for TB and some said it was the dust. But the mill

never told us what it was for or how bad off we were, so it died out after a while.

When I left the mill, the company doctor called me in. He said I had bronchitis, and he layed it to smoking, and he went on a lot about my heart being bad and a artery being enlarged. Funny, when I was trying to get my disability, none of the other doctors said there was anything wrong with my heart.

That Dr. Battigelli never sent me a report, but I got it from my doctor, and Battigelli said, "She does not present *convincing* cyclic disorder which would allow diagnosis of byssinosis." What did he think I was doing, lying? Since I know now what I didn't know then about how they tell if its brown lung, I think that doctor tricked me. He asked me a bunch of questions, and I told him my chest was tight and my breathing was worse when I went back to work on Sunday night. But he asked me if I felt worse at the beginning or the end of the week, naturally I figured I felt worse at the end of the week; I was give out from working all week. It had got to where my breathing was bad all the time and it was hard for me to hold out.

My breathing is better since I've been out of the mill, but where does that leave me? I got nothing to live on, no pension, no nothing. And I've give that mill the best part of my life and work.

Gilbert Stone

* * * * *

When they started giving us the breathing tests at the mill, they didn't say nothing about the cotton dust, no details, they just said they wanted to check our breathing for our own benefit. But they never told us why, or what we were taking it for. People complained about having to take it and blow, but everybody did it anyways. Some people that blowed so hard had their noses bleed.

* * * * *

Linnie Mae Bass

April, 1977

* * * * *

Since we are the last group of brown lung victims to talk, we want to try to tie together what all the rest of our members have been testifying about. And the two most important things I want to emphasize are this: *The companies can not be trusted to do their own educating, and they can't be trusted to do their own medical testing and tell us the true results.*

You have heard testimony over and over from our people about how the companies never educated them about the cotton dust and never told them the results of their breathing tests. Well, Burlington never told me mine either.

* * * * *

Hubert Graves

April, 1977

My name is Hubert Graves. I worked 22 years as a bobbin man in the spooling and warping department of Erwin (Burlington) mills. I was forced to come out of the mill on pulmonary disability at age 54, back in 1974. I didn't plan it that way; I thought I had 10 or 11 more years to work when I was 54, but I just couldn't hold out.

I don't think the companies should be allowed to measure the dust in the mills because I don't think they'll do it right. When I worked there, when they measured the dust in the spooling department, they put that machine at the end of the spoolers, nearest the air conditioning vent. They didn't put it in the middle.

Besides being a bobbin man, I spent the better part of 12 years blowing off the dust every Saturday or Sunday. We just spent the whole day, me and two other

clean up hands, just blowing the dust down and sweeping it up. And that dust was just a-flying and a-fogging everywhere. We blowed across the machines in each other's faces and blowed it down from the ceiling in our faces and all over us. But the company never told me it was bad for me, and they never told me to wear a mask or nothing. The just had us wear safety glasses or goggles, but they never said nothing about masks. Up to 1974 when I come out, I never saw a mask in Erwin Mill.

That dust put me out of work, 10 years before my time. About 1965 I started getting short of breath and got to coughing all the time. I kept on working and it kept on getting worse. The last few years I worked I'd have to miss right smart of work. I was in and out of the hospital so many times, I can't even remember how many times.

My doctor he kept trying new pills and medicine 'till he finally said he'd give me everything he knew to treat me, and the only thing he knew was for me to get a transfer to another part of the mill. But the mill kept saying there weren't no jobs to transfer to, even though they knew I was bad off. They said one time, "If you aren't able to run your job we'll have to replace you.

My doctor finally said I should get out altogether. That it was shortening my life everyday that I was in there.

But I knew that I had to go to work. I had 3 kids at home to support and I just went back and kept on trying. I finally just collapsed on my job and didn't ever go back. I got my disability at age 54, not able to work anymore and support my family.

My point in telling my story is this: the company never educated us about the effects of the dust, even though they knew, and I don't think that they will do

it right, even now. When they started the breathing tests, they never told us what it was for and we never knew, and they never told us what we scored. The company let me work overtime every weekend cleaning up that cotton dust but they never told me it was bad for my lungs or never gave me a mask to wear. They wouldn't even transfer me out of the dust when my family doctor wanted it. They just want to make money and they don't want to be bothered with sick workers.

I think that the companies have done us and our people enough harm already and they shouldn't be allowed to do no more.

Not for seven more years.

* * * * *

William R. Tyndall

April, 1977.

My name is William Tyndall. I am 66 years old now and I've been disabled by brown lung disease since I had to come out of the mill at the age of 59 in 1970. I was a doffer in the spinning room of Burlington Industries' Erwin Mills for 35 years.

I said I've been disabled by brown lung disease for 7 years, but I should say that I only found out I had byssinosis this year when I filed for compensation and got sent to a doctor who could tell me what it was.

I started being bothered by shortness of breath back in 1962. After a while, I went to Dr. Adair who was the company doctor. He said that I had emphysema and he might have to take me out of the mills. I knew I had to keep working to survive, so I kept on running my job for a couple of more years. When it started getting to where I just couldn't hold out to run my job, I went back to Dr. Adair, but then he wouldn't say nothing about me quitting work. Sc, I went to another doctor who advised me to get out of the mill.

I knew something was wrong, because I couldn't hold out on my job. But I didn't know what, so I took a temporary lay-off until a job would come open that I thought I could hold out to run. To show you how dirty they'll do you, the company tried to fight me getting unemployment. I was a good doffer and they didn't want to lose me. They said that they had a job I could run when they knew I couldn't run it. But the unemployment ruled in my favor.

As soon as a job came open that I thought I could run, I went back to the mill. I worked for six weeks at this job, and it was a 90¢ per hour wage cut, but I just couldn't hold out. My doctor helped me get disability. Nothing else has ever been wrong with me except my breathing and this lung disease.

Where I worked I know a whole lot of people have had to come out early because of breathing problems. I've seen several people collapse of their jobs and some who were just carried out on stretchers. A lot of them that would be my age and that I grew up with, are now dead.

I know a lot of millworkers would keep on working when they weren't able because they had to work to survive and had no other choice. As long as they could run their jobs, the company didn't care how bad off they were. The companies are mainly concerned with keeping production up and keeping the machines running. They care alot more about their machines than they do about their employees.

Most of what they did before I came out has tended to make the problem even worse. The windows were bricked up. Automatic sweepers and cleaners were put in, which kept the lint and dust fogging up. All of these were money saving projects. Now it's about time they spent some money reducing the dust levels and not wait for seven more years.

* * * * *

EXHIBIT 54a

Statement of Carolina Brown Lung Association

* * * * *

D. *RESPIRATOR USE*

OSHA has proposed that when engineering and work practice controls have not reduced dust levels to the proposed .2 mg/m^3 standard, then the employer shall "provide and assure the use of" respirators. This clause, together with the proposed delay of 7 years in meeting the standard, ignores the fact that the employee is, in effect, being punished because the employer has been negligent in complying with the OSHA law. Carolina Brown Lung Association members are very familiar with the harsh discomfort, exasperating annoyance, and in some cases, agony, of wearing respirators while working, even for brief periods of time. To suggest that this could be done day-in and day-out for 7 years simply shows that the proposal writers have never worn respirators. The respirator does not provide the user with a cool, effortless stream of fresh air, as some would imagine. Breathing through one is extremely hot, and often difficult or impossible when the dust has clogged the filter pores, especially for those with existing respiratory problems.

The proposal also does not address the fact that, for some individuals, any given (and in some cases, many) respirators may not fit properly. Since respirators are designed for an "average employee", women, and employees with sideburns, scars, glasses, or merely slightly different facial shapes are often not afforded equal protection by respirator use. It must be recognized that some employees with certain preexisting health problems, such as heart conditions, should not wear respirators. There is also no mention of the fact that wearing respirators will in some cases lower production capabili-

ties of workers. Fatigue and reduced efficiency occur more quickly among workers wearing respirators; those on piece-rate wage scales may suffer wage loss as a consequence.

The Carolina Brown Lung Association believes that:

1) the textile industry should be required to meet a .1 mg/m^3 standard now.
2) where respirators must be used, employees should be given a choice from a wide variety of respirators, including the single use respirator, and the powered respirator.
3) the standard must disallow any company requirement that an employee who refuses to wear a mask must sign a statement limiting the company's liability.
4) employees must be protected from economic losses occurring as a consequence of wearing respirators.
5) those employees with health conditions which preclude the use of respirators must be given the option of transfer to a less dusty area with no loss of pay or seniority.

E. *MEDICAL SURVEILLANCE*

OSHA's proposal for a medical surveillance program for textile industry employees emphasizes a rigorously "scientific" screening of those workers at risk, but ignore some basic realities of management/employee relations in this predominantely non-union industry in the South.

The personal experience of many Carolina Brown Lung Association members is that a medical surveillance program without a job/rate retention clause is virtually meaningless. Even if one were to assume that OSHA's proposed dust control measures were *immediately* implemented, there would be no job protection for the thou-

sands of active workers who now have some stage of byssinosis. Many CBLA members, when the disease they had contracted in the mills became severe enough so that they could not work "productively", were simply asked to leave—often after having been told by the company doctor that they had bronchitis or emphysema, and often with their pensions slashed, since they had had to "quit" early. CBLA members believe that there is no reason to expect a drastic change in management behavior, and that the first requirement of a medical surveillance program would be a clause giving the worker the right to transfer with no economic discrimination.

The mechanics of the program which OSHA has proposed also ignores the basic nature of the relationship between company doctors and the mills for which they work. OSHA proposes that any doctor of the company's choice will conduct the medical surveillance program (restricted only by very broad guidelines), will determine, for each worker, whether specific findings or diagnoses are related to occupational exposure, and will give an opinion as to whether the employee's exposure to cotton dust should be limited. The experience of many CBLA members with their company doctors suggests that OSHA's trust in these doctors' objectivity is misplaced. CBLA members have been told for years by company doctors that their respiratory problems were bronchitis, emphysema, asthma, "caused by smoking",—or simply not told anything at all about their medical conditions. Given the fact that diagnosis of initial stages of byssinosis is based on subjective interpretations of subjective responses to a questionnaire, allowing a company doctor to determine whether a disease is occupationally related would only perpetuate a system which has blatantly neglected disease victims.

The Carolina Brown Lung Association believes:

1) that medical personnel conducting the medical surveillance program must be independent—not be an

employee of any employer covered by the standard, nor have any financial relationship other than as recipient of fees for examinations.

2) that data generated by medical examinations should be sent to NIOSH where analysis according to the "standing diagnostic criteria" (discussed below) would be carried out. An employee would be sent the results of such tests together with an explanation of his right to transfer and to other measures designed to protect his health.

3) that, in order to protect the employee, NIOSH should produce a program of "standing diagnostic criteria" which would determine those medical and administrative measures available for a given medical examination result. We support the proposals made by ACTWU in this regard, and suggest that this concept be extended to include a larger range of possible questionnaire and spirometry findings, thus closely defining what is a "significant change" in examination results, and the medical and administrative measures which would be dictated by each.

4) that not only physicians, but paramedical personnel could conduct medical surveillance programs.

5) that NIOSH should institute a quality control program to review the industry's medical surveillance activities.

EXHIBIT 55

Statement of Moon W. Suh, Ph.D. Senior Operations Research Analyst, Burlington Industries, Inc.

I am Dr. Moon W. Suh, Senior Operations Research Analyst of Burlington Industries. I am a professional statistician with a Doctor of Philosophy degree in Statistics from North Carolina State University. During the last seven years, I have been responsible for analyzing all biomedical data of Burlington Industries which include byssinosis prevalence, pulmonary function, and level of dust exposure for thousands of employees working in the cotton processing areas of the Company. I have conducted numerous statistical studies on byssinosis as well as on cotton dust, of which much has been published in scientific journals. Accordingly, I testify as one of few research statisticians who has worked extensively on the perplexing issues of byssinosis.

To begin, I must point out that the entire byssinosis issue still remains to be only a statistical paradox in the complete absence of any definitive science on the diagnosis and pathogenesis or proven knowledge of the responsible chemical components. Indeed, we are still playing the game of numbers based strictly on isolated incidences or yet-to-be-found laws of probability at best. Despite all this, we now have a proposed cotton dust standard based solely on scattered statistical figures that are dangerously biased and insufficient for the awesome purpose of legislating a federal standard.

Specifically, I will point out the fallacy of one statistical study which has been responsible for the proposition of a 0.2 mg/m^3 dust standard. Following this, I will show entirely different results from a study made by Burlington Industries which we consider to be unbiased in population selection and statistically sound in model

selection and analysis. The wide disparity between the two studies will exemplify the fragile foundation for the proposed 0.2 mg/m^3 dust standard.

The background argument for the proposed OSHA cotton dust standards draws inferences heavily from a study published by Merchant and others[8] in the Journal of Occupational Medicine in 1973 titled "Dose-Response Studies in Cotton Textile Workers." The so-called "probit analysis" shown in the study, which I will call "the Merchant study" from here on, projects byssinosis prevalences at 0.1, 0.2 and 0.5 mg/m^3 respirable cotton dust to be 6.5, 12.7 and 25.8%, respectively, for workers in preparation and yarn areas. The authors, then, proceed to recomemnd 0.1 mg/m^3 as a "reasonably safe" dust level implying, perhaps, that a 6.5% byssinosis prevalence is a reasonably safe risk. Since there does not exist another dose-response study of any type for predicting byssinosis prevalence directly from dust levels, as measured by a vertical elutriator, it is safely assumed that the proposed 0.2 mg/m^3 standard stems from this study. The study, however, is considered totally unfit and inadequate for being applied to formulation of a federal standard in view of its definite biases and errors in study design, statistical analysis and conclusions. The reasoning is as follows:

1) BIASES IN STUDY DESIGN

For a general prediction purpose, it is a norm to any statistical study that the sample population should be representative of the parent (total) population. In order to accomplish this, a rigid randomization scheme has to be applied in the sample selection process. The Merchant study, however, does not meet this. As they report in their study [6 (pp 93-94), 7], two of the five cotton and cotton/synthetic plants were at "extremes of exposure," meaning that the plants were old and processing

worst quality cottons. The remaining three, although not stated explicitly in the paper, also belonged to the same category. The plants seem to have been so selected to maximize the chances for observing a large number of employees with symptoms of byssinosis. This is evidenced from data reported in the study itself on employee length of exposure. The data shows [7, Tables 1 and 2] that as much as 53% of all employees in cotton and blend mills had been exposed to cotton dust for more than 15 years whereas only 16% had worked for that many years or more in the control plants processing synthetic or wool. Moreover, as many as 36% of all employees in cotton and blend mills worked over 25 years while only 4% of all employees in control plants worked over 25 years. These statistics are staggering and such bias alone guarantees a highest possible prevalence of the symptoms of byssinosis as defined by questionnaire without regard to the level of cotton dust they were exposed to at the time of survey. In addition, the authors required the cotton plants for the study to be located within a textile mill village, thus further increasing the chances for continuous and prolonged employee exposure to dusty environment. More importantly, the cotton processed in the selected plants was mostly "strict low middling" which is a low grade cotton known to contain as much as 5.1% non-lint materials according to a book by Grover and Hamby[2]. All these unusual, non-representative factors in the Merchant study were responsible for observing as high as 19.2% byssinotics in cotton plants and 8.2% in blend mills. In a published 1971 Burlington study[3] using over 10,000 sample subjects, or more than 5.5 times the number surveyed by Merchant and others, the average prevalence was only 5.2% at cotton plants and 4.4% in cotton/synthetic blend mills. These amount to only less than one third and about half of the corresponding prevalences found from the Merchant study. The large differences are not from random errors of survey. Instead, the differences are almost entirely due

to the systematic biases clearly demonstrated in the Merchant study.

Most importantly, the sample size of 1,271 in preparation and yarn areas was simply too small to represent the entire textile population, especially for predicting prevalences at every possible dust level below 1 mg/m^3. Consequently, such important variables as sex ratio, age, % smokers and length of exposure were surveyed but could not be taken into account in establishing the so-called "dose-response" relation.

In summary, Merchant study does not represent the cross-sectional average of textile population exposed to cotton dust. The proof for this is evident from the demonstrated biases in study design, the insignificant sample size and deletion of all relevant statistical factors essential for establishing an acceptable dose-response relation.

2) BIASES IN STATISTICAL ANALYSIS

It seems rather pointless to argue the quality of analyses when the basic design is already shown to be totally biased. Nevertheless, I am compelled to point out the serious biases and errors of statistical analyses contained in the study. If we are to talk about numbers and the limits as criteria of importance, the following points should raise serious questions on the validity of the proposed standard.

A. "*Probit Model*"—The fact that probit model is inappropriate can be established by examining the underlying binomial assumptions and the reported data. First, the symptomatic response of byssinosis is not a quantal measure such as "dead or alive" type of response normally found in toxicity studies. Instead, the byssinotic response is highly subjective, as it is nothing more than a positive response to a question, and involves large

statistical errors. Second, more often than not, a given subject had been exposed to varying levels of cotton dust prior to the time of survey, and this wipes out the independence assumption governing the binomial distribution. In his book *Probit Analysis*, Finney [1, p 27] states: "The complete independence of the subjects tested at different doses, and of the binomial distributions associated with them, is implicit in the theory of all the methods presented in this book." In this regard, there is no better way to invalidate the use of a probit analysis than the following statement made, perhaps inadvertently, by Merchant [6, p 103] on his own analysis:

> "—it must be stressed that the cross-sectional nature of this study indicates that the *probability* (of byssinosis) *determined in these analyses is the probability that a subject has the disease at the time of observation, rather than the probability of developing the disease.*

What better statement than this to disqualify the probit model! Third, as the authors admit in their paper [8, p 228], the data shown in Table 4 of the study clearly demonstrate the fact that byssinosis prevalence is *not* zero at zero dust level. This is another proof that the probit analysis applied in the Merchant study was totally inappropriate for the data.

Finally, the probit model, when combined with a logarithmic transformation of dust level, not only projects a zero prevalance but also a zero confidence limit at zero dust. In addition, it creates fictitiously narrow confidence limits at low dust levels regardless of the spread in actual prevalence data. All these are more than sufficient for invalidating the probit model and the con-

clusions therefrom. However, let us continue to examine the following.

B. *Grouping/Categorization of Data for Probit Analyses*—It is observed that the methods, if any, used for forming the basic sample points in Tables 3 and 4 of the paper are totally without logic. Any statistically minded researcher will know that a different grouping and categorization methods can create artifacts and therefore and absolute objectivity and unbiased rule must be applied in forming the basic sample points.

First, why categorize by dust levels in the first place at the sacrifice of sample size? Some merging might have been necessary for sample points with small number of employees. But, the grouping by dust level in Tables 3 and 4 was obviously improper in terms of obtaining the highest valid statistical correlation.

Second, it is impossible to understand how the authors came up with the end points of the dust ranges shown in Tables 3 and 4. The intervals are neither uniform in size nor varying with any consistency. Were the intervals and end points created by the observed data? If so, for what purposes?

Third, in Table 4, the "mid-points" of dust ranges were given in arithmetic mean for Groups 1, 2, and 4 and in geometric mean for Groups 3, 5 and 6. There is no justification for this inconsistency. It is a mathematical fact[5] that the geometric mean is always less than or at most equal to the arithmetic mean when the observations are non-negative. This can be seen in Table 1, where the arithmetic means are shown to be greater than geometric means by about 60%.

What does this mean? It means an unduly high predicted prevalence at every dust level by applying geometric means. It is not my ultimate intention to correct the bias using the average figure quoted above. The figures speak for themselves.

C. *Inflation of Prevalence Through Abuse of Median, Geometric Mean and Arithmetic Mean*—The original cotton dust data in Merchant study were given in medians which are strikingly lower than the corresponding arthmetic means. In Table 1 of the paper, the arithmetic means were shown to be higher than the medians by as much as 34.8% and 65.6% due to the extreme skewness in the dust distributions. Such magnitudes of skewness are quite unreal based on all existing statistical facts. In a 1974 study[9], the mean dust level in a carding area (0.977 mg/M^3)' was shown to be only 17.7% higher than the corresponding median (0.830 mg/M^3) based on 103 vertical elutriator samples. In a spinning room, however, the mean (0.439 mg/M^3) was only 2.1% greater than the median (0.430 mg/M^3) based on 87 samples. In other surveys[4] conducted by Burlington Industries in 1971-72, the mean was, on the average, only 5.3% higher than the corresponding median based on several hundred samples taken at 48 separate working areas.

In general, dust samples are positively skewed. Nevertheless, the degree of skewness is insufficient to negate a normal distribtuion assumption. Simply, arithmetic means cannot be greater than medians by as much as 50% on the average based on any other reported study. What does this mean in terms of the dose-response relationship? It

means that had means been used instead of medians, the projected prevalences of 6.5, 12.7 and 25.8% should occur *not* at 0.2, 0.2 and 0.5 mg/M^3 but at 0.15, 0.30 and 0.75 mg/M^3, namely at 50% higher dust levels instead. This effect, combined with the use of geometric mean in the probit analysis, creates the highest possible value of predicted prevalence at any hypothesized dust level. This type of statistical inference is certainly deplorable and particularly so for the purpose of applying to federal regulations.

D. *Exclusion of Sample Points*—The Merchant study excluded sample points with 1 mg/M^3 dust levels or higher in their analyses because "those exposed to these high dust levels were likely to be a select, more resistant group." To say the least, the assumption is completely without substantiation. In fact, this assumption was withdrawn in the analysis of workers in the slashing/weaving areas, areas where the prevalence was quite low. The study clearly shows that the subjects at the sample points with 1 mg/M^3 dust levels or higher are all males except one, 68.5% smokers and 40% black [8, Table 3]. All these factors indicate that the excluded employees constitute a less "resistant" group instead of being more "resistant."

E. *Computational Errors*—The published studies of Merchant and others show at least five different numbers of sample subjects for the same study according to Tables 1 and 2 of the dose-response study and Tables 1 and 3 of the preceding paper[7] by the same authors. It can be any one of 1,271, 1,257, 1,259, 1,318, or 1,237. Furthermore, there are numerous computational errors which question the accuracy of the reported data.

3) CONCLUSIONS ON MERCHANT STUDY

A. The dose-response study by Merchant and others had built-in biases in location and age of plants, length of exposure to cotton dust and quality of cotton processed. Consequently, the dose-response relationships as well as the projected byssinosis prevalences are totally biased and hence non-representative of the average textile population exposed to cotton dust.

B. The "probit" model and the resulting dose-response curves are totally inappropriate in view of both the underlying assumptions required by the model and the actual data observed. Therefore, the predicted prevalences and their confidence limits are totally invalid, particularly at low dust levels.

C. The methods used for grouping/categorizing original data in formulating sample points were unwarranted, inconsistent and least objective. Hence, the uniqueness of the conclusions is open to question.

D. Use of median and geometric mean, together with the extreme skewness present in dust distributions, forced the projected prevalences to be the highest of all at all dust levels. The magnitude of bias from this alone is sufficient to warrant a major correction in dose-response relation and an equivalent adjustment in the proposed cotton dust standard.

E. The logic applied for excluding sample points with 1 mg/M^3 or higher dust is without proof. This and other significant discrepancies in the tabulated data seriously challenge the credibility of the study.

F. Based on all above, the results of dose-response analyses by Merchant and others are considered totally unfit to be applied to formulation of federal cotton dust standards.

4) DOSE-RESPONSE STUDY BY BURLINGTON INDUSTRIES

Finally, I would like to present the results of a dose-response study made by Burlington utilizing 2,865 subjects. Leaving the details to the research report herein submitted as a supporting document, I will give only the highlights of the study.

The study utilized the first companywide byssinosis survey conducted in 1971. These virgin data were preferred over other subsequent survey results since they are free of possible bias due to repeated surveys. A total of 19 cotton and blend mills with 99 separate working areas provided 1,776 males and 1,089 females, or a total of 2,865 subjects. Mean dust levels, not the medians, were matched to the prevalence data for the 99 work areas. The cotton dust samples were taken by vertical elutriators with flow rate of 1.61 liters per minute.

Because of the large statistical errors inherent to the estimation of binominal probability, the work areas having small sample sizes were merged by applying a strict randomization scheme. Sample points were formed with minimum cut-off limits of 15, 20, 25 and 30 persons per point in an increasing order of dust level when merging was necessary. Any tie resulting from identical dust levels was broken by applying a pre-designated randomization scheme. Since different cut-off limits may exhibit different dose-response relations, all results were reported and compared.

The statistical model applied was a weighted least-squares method based on a square-root arc-sine transformation of percent prevalence. Under the model, the

transformed response variable becomes uniform in its asymptotic variance, thus satisfying the basic requirement for making a normal regression analysis.

The dose-response prediction equations were obtained for the combined total population of male and female with and without considering the smoking effects. Confidence limits were also obtained for the predicted prevalences. All prediction equations were found to be statistically significant, but the different cut-off limits for sample points did not yield any significant difference in the dose-response relations. Predicted prevalences of smokers were shown to be somewhat higher than non-smokers. The differences were statistically significant at 10% error level.

The predicted prevalences from the Burlington study were much lower than the corresponding values reported by the Merchant study. The large differences are definitely not from random variations but from the systematic biases of the Merchant study as previously discussed. The magnitudes of differences are as follows for the total population:

> At zero dust, the Merchant study projects zero prevalence due to the severe limitation in the "probit" model and not due to an absence of observed byssinotics. The Burlington study, on the other hand, projects 2.2% at zero dust. This may imply more than two out of 100 who have never been exposed to cotton dust can be incorrectly diagnosed as byssinotics or migration of byssinotics from high dust areas to areas with near-zero dust. At 0.1 mg, the Merchant study projects 6.5% byssinosis whereas only 2.8%, or less than half, is projected by the Burlington study. At 0.2 mg, the Merchant study predicts 12.7% or almost four times the 3.5% prevalence pro-

jected by the Burlington study. At 0.5 mg, the Burlington study predicts 6.0% while the Merchant study predicts a whopping 25.8%, or more than four times the Burlington figure. In short, 0.1 mg in the merchant study predicts even higher percentage of byssinotics than the Burlington estimate at 0.5 mg. Such a large gap is also apparent in another comparison. As Dr. Imbus will (has) discuss(ed) in his testimony, an industrywide survey of 41,283 subjects exposed to cotton dust revealed that the overall byssinosis prevalence at dust levels 0.5 mg/M^3 or higher was only 3.2% out of a total of 6,855 employees in that category. This is less than half of the prevalence the Merchant study projects at 0.1 mg. We need not develop another dose-response relation to prove the extreme bias in the Merchant study. The raw data is more than enough.

The Burlington study may not be the most ideal one for representing the entire textile population exposed to cotton dust. It simply proves the vulnerability of Merchant's results under a different set of population and analyses. Nevertheless, it is my honest view that the Burlington study has many improved features over the Merchant study; larger and more representative study population, unbiased plant selection, application of more appropriate model and complete absence of subjective data handling would be the key advantages.

In concluding my testimony, I must come back to my earlier criticism on the Merchant study. Simply put, *the study is completely invalid, statistically or otherwise, for the purpose of predicting the byssinosis prevalence of the average textile population from a hypothetical level of cotton dust.* The study may have proven an existence of correlation between the two. No more and no less. It

certainly failed to provide a reliable prediction equation. Should this type of study ever be applied in the formulation of a federal standard? The answer has to be definitely "No." What other scientific criterion, statistical or otherwise, then is there for promulgating 0.2, 0.35 or 0.5 mg/M^3 dust limits as measured by a vertical elutriator? I find very little evidence which supports such specific numerical figures. To this statistician, the standards appear to have been drawn from subjective criteria rather than an unambiguous goal scientifically established.

5) REFERENCES

1. Finney, D.J.: Probit Analysis, 3rd Ed., Cambridge University Press (1971)
2. Grover, E.B. and Hambry, D.S.: Handbook of Textile Testing and Quality Control, Textile Book Publishers, Inc., New York (1960)
3. Imbus, H.R. and Suh, M.W.: Byssinosis—A Study of 10,133 Textile Workers, Archives of Environmental Health, *26* 183-191
4. Internal Dust Survey Reports 1971-1972: Burlington Industries, Inc. (Unpublished)
5. Kendal, M.G. and Stuart, A.: The Advanced Theory of Statistics, Vol. I, Charles Griffin & Co., Ltd., London (1963)
6. Merchant, J.A.: Epidemiological Studies of Respiratory Disease Among Cotton Textile Workers 1970-1973, An Unpublished Ph.D. Thesis, University of North Carolina, Chapel Hill (1973)
7. Merchant, J.A., et al.: An Industrial Study of the Biological Effects of Cotton Dust and Cigarette Smoke Exposure, Journal of Occupational Medicine, *15*, 212-221 (1973)
8. Merchant, J.A., et al.: Dose Response Studies in Cotton Textile Workers, Journal of Occupational Medicine, *15*, 222-230 (1973)
9. Lin, G.C. and Suh, M.W.: Characterizations of Statistical Distribution for Cotton Dust Levels, Internal Research Report, Operations Research Department, Burlington Industries, Inc. (1974)

EXHIBIT 60

Statement of Hovan Hocutt, Senior Vice President, Engineering Pneumafil Corporation Before the Public Hearing Concerning the Proposed Changes in the OSHA Cotton Dust Standard

My name is Hovan Hocutt. I have a Bachelor of Science degree in Aeronautical Engineering from North Carolina State University and I am a licensed Professional Engineer. I have 13 ½ years experience as factory engineer and officer of a woven asbestos brake lining factory where one of my responsibilities was the engineering control of asbestos dust. I am now Senior Vice President-Engineering of the Pneumafil Corporation, Charlotte, N.C. where I have been since 1950. Pneumafil Corporation was formed in 1946 to design and manufacture systems for the control of lint and dust in the textile yarn manufacturing industry. This has always been its primary business. We are in regular contact with leading manufacturers of cotton dust control systems in England, Germany, Switzerland, Hong Kong, Japan and other foreign countries.

In June of 1972, Pneumafil Engineers began work on NIOSH Contract HSM 99-72-44 to determine what engineering controls would be necessary to achieve a dust level of 0.5 mg/M^3 as measured by the vertical elutriator (VE) in the processing areas of opening, picking, carding, drawing and combing. Some investigation of dust capture devices and air quantities required to achieve 0.2 or 0.1mg/M^3 VE was also included.

The results of this research were published under the title "Cotton Dust Controls in Yarn Manufacturing", HEW Publication # 74-114 by NIOSH in March, 1974. This report described dust capture and filter equipment which could achieve dust levels of 0.5 mg/M^3 VE. En-

gineering controls that could hold the median dust concentration to a level not exceeding 0.2 mg/M³ VE in the working environment of drawing and combing processes were also described. Dust capture devices and air quantities necessary to achieve a median dust concentration of 0.2 mg/M³ VE in the carding environment were also described. However, the report pointed out that a practical application of fine dust filters which are efficient on particulate sizes of 15 microns or less had to be developed and added to existing engineering controls for achievement of of median dust concentration of 0.2mg/M³ in the areas of opening, picking, and carding. This report was widely distributed by NIOSH and I assume that those interested in this subject are familiar with this report. Therefore, I will not take the time here for a description of the technology involved.

I can report that there have been improvements in both efficiency and cost of engineering controls since publication of the report. For example, we have reduced air quantity requirements for opening and picker hopper covers by 50% and maximum air quantities for cards by 12.5%. These and other improvements have helped to offset some of the inflation in machinery prices.

After the NIOSH study, we, also made an analysis of existing filter technology and concluded that the most practical fine dust filter (less than 15 microns) for cotton dust control in opening, picking and carding areas would be two-stage, low voltage electrostatic precipitators, commonly called electronic air filters. Pneumafil Engineers conducted tests in an operating cotton mill card room with laboratory size electrostatic precipitators over a period of 3 years. Although we do not have any experience with production size equipment, we are confident that we know how to aply these fine dust filters to lint and dust control systems in opening, picking and carding areas in cotton mills.

Unfortunately, electrostatic precipitators specified at required efficiency would stand about 12′ high x 15′ wide and including transitions about 30′ long. They would weigh about 8,000 pounds for a system handling 50,000 cfm. Our experience indicates prefilters will have used up all of the available space inside the processing area and it will be necessary to install the precipitators outside the processing area in new buildings or in insulated enclosures on the roof of the mill.

Our cost data, to follow, for engineering controls to achieve a cotton dust level of 0.2 mg/M^3 VE $\overline{X}$ (average) in opening, picking and carding will include conventional dust capture devices on the production machines, a preseparator for removing the lint load from the primary airstream, automatic rotary drum filters, each of which are extremely large, in one or two stages to remove the coarse and medium dust and electrostatic precipitators to remove the fine dust. Electrostatic precipitators will not be required beyond carding.

At the request of ATMI, Pneumafil Engineers began an economic impact study covering engineering controls for cotton dust to achieve various cotton dust standards. This study is based on information provided by an ATMI questionnaire sent to all of its member mills. These questionnaires provided information by individual mill on numbers of bales of cotton processed, ratio of synthetics to cotton in blends, numbers of each type of cotton processing machinery by department such as opening, picking, carding, etc. Production speeds and other data affecting generation of cotton dust were also provided. Type of humidity and temperature controls for each process area and air conditioning filters were specified along with air change rates and the descriptions of air conditioning supply and return-air arrangements.

Completed questionnaires were returned by 369 mills. Relevant information was supplied by 353 mills (others

were not processing cotton or did not involve the relevant processes). The 353 mills processed 5,719,393 bales of cotton from August 1, 1973, through July 31, 1974. This was 80% of the 7,149,887 bales processed by the entire U.S. industry in the same period. Also these 353 mills accounted for 13,310,696 spinning spindles in place. This was 83% of the 16,056,978 spindles in place processing cotton or cotton synthetic blends in the entire U.S. textile industry.

All information concerning in-place air conditioning systems was tabulated from the questionnaires and given to Mr. Arthur Thomas of The Bahnson Company for use in estimating the cost of air conditioning systems required to absorb the added loads imposed by the lint and dust control equipment.

Tabulations were made of the total number of each type of cotton processing machinery with production rates and other pertinent information. Air quantities (cubic feet per minute) required for each type of processing machine to capture the cotton dust and the average cost of dust control equipment per cfm were added to these tabulations. Air quantities and equipment costs for opening, picking and carding were based on actual installations. For other processes, these figures were estimated from analysis of typical production units. From these tabulations gross total costs of engineering controls for each type of machine and each process was calculated. Gross total horsepower and cubic feet per minute of air (cfm) required for lint and dust control systems was also calculated and given to Mr. Arthur Thomas.

In addition to information provided by the questionnaire, additional dust sampling data was provided through ATMI from more than 70 mills. To this was added, for weave rooms, all qualified data secured from other sources and in the files of Pneumafil Corporation.

Total cfm, total installed horsepower, and total dollar figures were secured by ATMI from all significant lint and dust control systems contractors (SafeAire, Bahnson, Jenkins, Pneumafil). These figures included all engineering controls for cotton dust sold prior to February 11, 1977. The estimated dollar value of these controls (pre-February 11, 1977) was subtracted from our calculated gross cost figures for the industry. So, our estimate covers the industry's future burden *after* February 11, 1977. This point cannot be overemphasized.

Net totals were adjusted to represent totals for the entire textile industry in the U.S. on the basis that the study covered 80% of the industry (multiply ATMI data by 1.25). Annual maintenance and energy costs were estimated based on the same data. The cost which we will report includes all engineering, suction attachments on production machines, suction duct, insulation as required, separators, filters, #5 condensers, fans, drives, electrical and machine controls, all ducts required to connect the lint and dust control system to the air conditioning apparatus, exhaust and return air dampers with operating controls, fire detection and control devices for filters, equipment supports and roof reinforcement where required, hardware, installation ready to run, cutting, patching, electrical modifications, which the mill normally incurs, wiring, controls, and electrical service additions necessary for the lint and dust control systems. The costs are based on prices as of February 11, 1977. Any processes or operations not specifically mentioned are not included.

The costs do not include #6 condensers as required (they are usually on hand in the mills). Additional air-conditioning necessary to compensate for increases in horsepower loads required to operate lint and dust control systems, freight and taxes are not included.

Maintenance costs are based on 75% of an ideal maintenance program as suggested in the manufacturers' service manual. Labor rates were taken from "Employment and Earnings" published by U.S. Department of Labor (average hourly rate for a non-supervisory production worker is $3.53 per December, 1975-issue. Minimum rate of $2.30 per hour was used for helpers).

OPENING, PICKING AND CARDING AREAS

We have many years of experience with the engineering control of cotton dust in the processing areas of opening, picking and carding. We began to install lint and dust control systems in opening and picking rooms soon after the first of 1966. In February, 1972, we began to write performance warranties on these systems based on a cotton dust standard of 1.0 mg/M^3 as measured by an area sampler or 0.5 mg/M^3 VE, at the choice of the customer. Up to November 18, 1976, opening or picking rooms in 156 mills had been equipped or committed to engineering controls.

As of November 24, 1976, 25,510 cards have been equipped with some kind of Pneumafil Corporation lint and dust control systems. The first installations on cards were early in 1961 following experimental work which began in 1959. In March, 1972, we began to write performance warranties on lint and dust control systems for cards. We have equipped almost 7,000 cards under performance warranty to achieve 1.0 mg/M^3 dust levels as measured by an area sampler or 0.5 mg/M^3 VE.

DRAWING, COMBING AND ROVING AREAS

Engineering controls and required air quantity for capture of the dust generated by drawing frames are described and illustrated in the Pneumafil NIOSH Research Report already mentioned. This dust capture technology is still relevant and in theory, if combined

with properly applied preseparators and filters, should achieve 0.2 mg/M³ VE $\overline{X}$. However, there is very little actual experience and data to show that this is true. Our confidence is based solely on our long time familiarity with these machines. Pneumafil Engineers developed the first pneumatic roll clearer system for draw frames in the early 1950's. Now all draw frames, wherever built, are equipped with a similar system. We have made measurements of the dust concentration of air exhausted by the collector unit which is a part of the pneumatic systems. We find that surprising quantities of dust are cleaned out of the cotton sliver and discharged into the room. If the frames are equipped with power creels requiring dust control hoods, the required air quantities are large and the system much more expensive. Electrostatic precipitators will not be required to achieve a 0.2 mg/M³ VE $\overline{X}$ dust level but in most cases the necessary filters, for lack of space inside the card room, must be erected on the roof or some other place outside of the production area.

The Pneumafil/NIOSH Research Report describes the dust capture systems required to capture the dust generated on combers to achieve a 0.2 mg/M³ VE $\overline{X}$ dust level. The technology described there is equal to the job and, when combined with properly specified preseparators and rotary drum filters, the dust level in comber areas can be controlled to that level. The combers in 15 mills in the U.S. are equipped with Pneumafil systems of this type. Some of them, however, are not equipped with automatic filters. This experience makes us confident that the required performance can generally be achieved. But it must be pointed out, that actual tests against any dust level have not been made. None of these systems have been sold under a performance warranty.

There is practically no experience and we have done no serious research to correlate the performance of exist-

ing engineering controls for cotton dust in the roving areas with any specific cotton dust standard. However, Pneumafil Engineers have developed pneumatic clearer and photoelectric stop-motion systems and have been working with roving frames since the early 1950's. The pneumatic roll-clearer system for roving frames is similar to drawing. The fiber waste is separated from the air-stream in a collector unit at one end of the machine by a screen but most of the dust is blown back into the room. Measurements of the dust concentration discharged by collector units on roving frames is about half what we find from drawing frames, but the quantities are still a significant contributor to the dust levels in card rooms.

A 0.5 mg/M^3 VE $\overline{X}$ dust level in a roving area should be achieved by capturing the discharge from the collector unit on each roving frame and conventional filters as described in the Pneumafil/NIOSH Report. A preseparator would not be required since this function is accomplished by the screen in the collector unit.

In the roving areas in many mills producing medium to fine counts this type of engineering control should suffice for achievement of a 0.2 mg/M^3 VE $\overline{X}$ dust level. However, in coarse count mills using relatively low grade stock and manufacturing products, such as industrial fabrics, it will generally be necessary to draw high air quantities (5,000 cfm) through the flyer area. This can be accomplished by mounting a rectangular plenum inside or behind the Samson with suction slots on the flyer side. Mounting a shield on the aisle side of the flyers along the length of the frame (similar to the guard which Saco-Lowell furnishes for the popular Rovematic) would complete the capture system. Automatic filters as already described would take out the dust with necessary efficiency. Electrostatic filters are not required. As with draw frames and combers, our experience indicates that all available space for filters in the card room

will have been used and these filters for the roving area must be located in insulated houses on the roof or in some other area outside the building.

After the roving area, we run out of factual and comprehensive experience. From this point, everything is educated guessing because we have no basis of technical studies and we have no practical experience in meeting a specified dust standard.

SPINNING

The yarn manufacturing process following roving is spinning. The spinning frame is a maximum challenge for the cotton dust control engineer. Typical modern ring spininng frames will be 30½″ wide and up to about 55′ long. The head-end gearing cabinet is enclosed. At the foot-end of the machine is a cabinet containing a collector unit similar to the ones described for drawing and roving machines. Between these end cabinets from floor to top of creel and from side to side the spinning frame is wide open. This openness is essential to the spinning frame's operating efficiency because it enables the overhead travelling blowers to reduce accumulations of lint and fly on the operating parts of the machine. This travelling blower is even more important to yarn quality by controlling accumulations of waste on the roller beam and around the drafting system and especially at the ring rail. One blower cleans many frames so the trackage must continue over the aisles at the ends of the frames.

In the last decade, automatic doffing machines have been developed. Some are mounted permanently to the machine and others run up and down the length of the spinning frame guided by floor tracks or rails along the side of the frame. Automatic piecing-up devices are also beginning to come into use. These recent developments tend to decrease the numbers of people exposed to the dust in spinning rooms.

Practically all spinning frames are equipped with a broken ends collection system. This equipment has several purposes, the first of which is to capture by vacuum (3 or 4 cfm/spindle) any yarn that may break between the nip of the rolls and the bobbin. When this occurs, the drafting system continues to feed yarn through the rolls which would otherwise break down more ends and cause yarn defects unless controlled. Another purpose is to capture whatever fly and dust is generated at the drafting system. All of this lint, fly and dust is carried through the orifices into the flute and through the flute elbows into the header. This is a duct which runs the full length of the frame into a collector unit at the foot end.

To decrease the dust level in a spinning room, the first and obvious thing to do is to capture the air and dust discharged at the collector unit, duct it to efficient filters, then to the air conditioning apparatus room for temperature and humidity correction before it is returned to the spinning area. Because of the overhead cleaners this is only possible when there is access to a suitable area under the floor of the spinning room in which the necessary ductwork can be located. Based on our experience, there will not be any space in the production areas to locate these filters. They must be located on the roof as described for some of the previous processes or in the air conditioning apparatus room upstream of the washers. Such space will be rarely, if ever, available unless the system is coordinated with new construction for additional air conditioning equipment.

Collecting the collector unit discharge does not achieve the required level, the only alternative is to move more air through and away from the yarn producing areas of the spinning frame through openings in the floor and out through ductwork under the floor to filters and air conditioning apparatus and back to the room through

the supply-air system. The dust generated in the space between the thread guide and the ring rail on each side of the frame must be controlled. We can anticipate a spindle speed of about 12,000 rpm. At this speed, dust particles will be thrown off the ballon at a velocity of 6,000 fpm (2″ ring). For complete control, we must limit these high velocity particles to the confines of the spinning frame. To do this, a barrier must be erected at each side of the frame from floor to top of bobbin. Then, all of the air which is being drawn out of the room through the openings along the floor under each frame would enter this semi enclosure between the top of the barrier and the bottom edges of the broken ends collection system header.

Unfortunately, this is not possible because the barrier would interfere with the piecing-up of broken ends whether manual or automatic. It would prevent proper cleaning of the ring and traveller area by the overhead travelling blowers. It would tremendously increase the accumulation of lint and fly on the operating mechanism below the roller beams requiring extensive and expensive manual cleaning. It would interfere with the application of automatic doffing mechanisms. Such a combination would reduce the operating efficiency to such a low level that the machine would be useless.

Without the barrier, the only alternative is to move massive quantities of air through the floor openings. We do not have any data to indicate what these air quantities should be to achieve dust levels such as .2 mg/M^3 VE $\bar{X}$ in coarse yarn mills but our experience indicates that they would be impractical in existing mill construction. In the new mills built in the 1960's with underfloor returns we have found that maximum air conditioning supply air quantity uses about 6 cfm per spindle. There will be air current, humidity and temperature problems if this figure is exceeded. We believe

that at last 11 cfm per spindle would be necessary in many mills.

Some thinking has been given to another alternative which would totally enclose lines of spinning frames so that the machinery would operate in one environment and the operator in another. Such an arrangement would still require the wearing of respirators when it was necessary for the operator to enter the machine area. Physically, such an arrangement would require complete reorientation and modification of existing manufacturing facilities and machinery layouts.

We, therefore, conclude that the only practical approach in existing spinning rooms is the capture and filtering of the air discharged by the broken ends collection system in those mills affected by the standard where underfloor space permits the installation of air handling ductwork sized to handle 1000 to 2000 cfm per frame. Our data indicates that this procedure would bring all but a few maximum-problem mills into compliance with a 0.5 mg/M^3 VE $\overline{X}$ dust standard. We suggest that this is all that the industry can do and that any standard below that is completely impractical.

TWISTING, WINDING, SPOOLING, WARPING (YARN PREPARATION)

The configuration of twisters is very similar to spinning but twisters have no drafting system and no broken ends collection system. Overhead travelling blowers are used on twisters, as on spinning frames, so any air duct must go out through the floor. Twisters do not generate as much dust as spinning and our data indicates that twisting room dust levels should not exceed .05 mg/M^3 VE $\overline{X}$. However, the data also indicates that 67% of the twisting room dust levels would exceed 0.2 mg/M^3 VE $\overline{X}$. The only available approach is to move massive air quantities through openings in the floor un-

der and along the length of the machine. As shown in our discussion of spinning, this is not a practical approach in existing cotton mills.

Winders (Schlafhorst, Leesona, Abbott, Schweiter) can be approached by air ducts from overhead and some popular models have built-in dust capture systems involving air quantities up to 21,000 cfm per machine (Schlafhorst). On others suction duct might be located in the machine effectively but air quantities will be high. We have estimated 10,000 cfm average where dust control equipment is required to achieve 0.5 mg/M^3 VE $\overline{X}$.

All spoolers (18 to 378 spindles, most machines 198-Barber-Colman) are equipped with a built-in lint and dust capture system. When combined with proper filters the area around these machines should not exceed 0.5 mg/M^3 VE $\overline{X}$. Modification of the suction plenums inside the machine and the filters to handle 50 cfm per spindle instead of the original 30 will improve this performance.

Pneumafil Corporation has been making lint and dust control systems for application to warper creels and comb areas for many years. However, this equipment has never been evaluated for performance against any specified dust level. Available dust level measurements indicate that warper areas will be less than 0.5 mg/M^3 VE $\overline{X}$ without engineering controls.

SLASHING AND WEAVING

We have no experience on slashers but it appears that most cotton dust is generated at the feed end of the machine. Local exhaust ventilation should control the dust in this area. Filters used on previous processes would not be satisfactory on slasher or weaving applications because the high humidity and sizing would blind the pores of such filters. Slashing and weaving area filters (AAF, AirMat or Rollamatic, Luwa, RDF) would

require some type of roll-up media which is automatically replaced after it loads to capacity with collected dust. Filters of this type have been used in the industry for many years. They are much more expensive to operate because of the filter media usage.

The loom is a compact machine without any built-in dust control system. It presents the same kind of challenge to the dust control engineer that we have discussed for spinning frames. It is a wide open machine, as it must be, for effectiveness of travelling overhead and manual cleaning. The operator must work over the shed at the front and over the beam at the back for access to the harness when replacing broken ends. Thus, any dust collecting hoods above these areas, as some have suggested, must be located at such height in order not to interfere with performance of work by the weaver, that they would not be effective.

Effective control would require directing the air, supplied to the weave room by air-conditioning ducts overhead, downward through the mechanisms of the loom and out through the floor. This would require openings in the floor, covered for safety with some kind of grid, so that air and dust could be carried away by ductwork under the weave room floor. These openings should be placed directly under the shed and harness area. We do not know what air quantity would be required to achieve any given dust level in the room but we estimate that at least 1000 cfm per loom would be required in coarse count mills to hold the dust level to 1.0 mg/M^3 VE $\bar{X}$.

We have combined all of the dust level readings for weaving rooms that we can put together from all sources. Nine hundred seventy-one measurements from 63 mills show that 11.5% of the weave rooms would require the control system outlined to reduce existing dust levels to

1.0 mg/M³ VE $\bar{X}$. Unfortunately, after discussion with some of our respected competitors and others, we estimate that not more than 10% of the weave rooms in the industry have the required underfloor access. There is no assurance, however, that the 10% with underfloor access are the ones that need it. Certainly, any more extensive application of this arrangement, not to mention increased air quantities, would require massive and unreasonable reorientation of textile mill structures and machinery arrangements, including moving machinery out of the mill, digging up floors (sometimes concrete), digging air tunnels and constructing additional buildings or expanding existing buildings to house massive filters and air conditioning equipment.

We assume that everyone has received a copy of our cost estimates (Hocutt Attachment #1) and that it is not necessary to read all the figures.

CONCLUSION

In conclusion, we must point out:

1. From an engineering control standpoint, it is technologically feasible to control cotton dust levels to .5 mg/M³ VE $\bar{X}$ and .2 mg/M³ VE $\bar{X}$ levels in the opening, picking and carding areas of virtually all cotton textile mills and the equipment to do so is commercially available for introduction into presently existing facilities without unreasonable reorientation and modification of those facilities and machinery and without significant interference with the production process.

2. From an engineering control standpoint, it is technologically feasible to control cotton dust levels to .5 mg/M³ VE $\bar{X}$ and .2 mg/M³ VE $\bar{X}$ levels in most drawing, combing and roving areas and the equipment to do so is commercially available. However, in a number of instances, such as coarse count

mills using low grade stock and in mills where the drawing frames are equipped with power creels requiring dust control hoods, additional insulated houses or rooms will have to be constructed on the roof or in some other area outside of the building.

3. In the area of spinning, it is technologically feasible from an engineering control standpoint to reach a dust level of 0.5 mg/M³ VE $\overline{X}$. Because of the various types of equipment required to maintain the efficient operation of the spinning frame, and because of the extensive modifications that would be required, including a virtual reinvention of the "wheel," to conceive of anything less than a 0.5 mg/M³ VE $\overline{X}$ requirement is totally impractical. The only practical method of controlling dust levels in spinning is to capture and filter the dust through the broken end collection system, but only where underfloor duct work can be installed to handle 1000 to 2000 cfm per frame and this cannot be done in many instances.

4. It is technologically feasible from an engineering control position to maintain a 0.5 mg/M³ VE $\overline{X}$ dust level in twisting. As in spinning, the dust control method used in twisting is to move massive amounts of air through openings in the floor under the machine. This too, is not feasible in many instances.

For winders, we estimate it would take an average of 10,000 cfm on required dust control equipment to achieve a 0.5 mg/M³ VE $\overline{X}$ dust level. We cannot offer any estimates on feasible controls beyond this point.

Spoolers are now equipped with built-in lint and dust capture systems and can reach a 0.5 mg/M³ VE $\overline{X}$ dust level.

It is our opinion, that with the equipment now in place in warping areas, a 0.5 mg/M³ VE $\overline{X}$ dust level can be maintained.

5. From an engineering control standpoint existing local exhaust around slashers can maintain a dust level of 1.0 mg/M³ VE $\overline{X}$.

The loom offers many of the same problems as outlined in spinning in the control of dust levels. Here again, massive amounts of air must be directed downward *through* the loom; to be extracted through underfloor ductwork. At least 1000 cfm per loom would be required in coarse count mills to achieve a 1.0 mg/M³ VE $\overline{X}$ level. To do more than this would require massive and impractical reorientation in a textile mill.

6. Obviously, based on this factual data it is economically and technically unfeasibe to achieve a raw cotton dust level of 0.2 mg/M³ VE $\overline{X}$ in processes past roving. Also, the capacity of the dust control industry is reflected by the total sales of $12 million which represents the largest sales year ever. At best, this capacity could increase approximately two to three times with the new demand. This means that if sales were to reach $30 million, it would take at least eleven years to supply the equipment necessary to reach a level of 0.2 mg/M³ VE $\overline{X}$ in opening-carding only.

Cost/Dollars
Cotton Dust Control Systems

Textile Process	0.5 Mg/M^3 VE $\bar{X}$ Equip. Cost	Maintenance Cost/Year	Energy Cost/Year	0.2 Mg/M^3 VE $\bar{X}$ Equip. Cost	Maintenance Cost/Year	Energy Cost/Year
Opening	6,256,383	133,312	589,963	25,818,973	262,852	1,190,900
Picking	21,914,519	397,241	2,254,650	42,762,527	542,545	3,345,151
Carding	29,337,703	672,046	3,751,459	121,868,495	1,527,603	10,542,040
Sub-Total	57,508,610	1,202,599	6,596,072	190,449,995	2,333,000	15,578,091
Drawing	13,697,778	132,622	1,368,075	44,212,483	411,112	5,000,936
Combing	—	—	—	6,874,565	67,848	813,529
Roving	5,412,737	52,754	528,683	37,169,720	429,793	4,088,148
Opening-Roving Sub-Total	76,619,125	1,389,781	8,492,830	278,706,763	3,241,753	25,480,704
				0.5 Mg/M^3 VE $\bar{X}$		
Spinning	13,517,498	379,803	1,582,088	13,517,498	379,803	1,582,088
Twisting	—	—	—	—	—	—
Winding	14,383,500	95,900	1,389,080	14,383,500	95,900	1,389,080
Spooling	2,965,900	21,188	327,485	2,965,900	21,188	327,485
Warping	—	—	—	—	—	—
Spinning-Warping Sub-Total	30,866,898	496,891	3,298,653	30,866,898	496,891	3,298,653
	1.0 Mg/M^3 VE $\bar{X}$			1.0 Mg/M^3 VE $\bar{X}$		
Slashing	—	—	—	—	—	—
Weaving	41,560,769	204,944	6,151,937	41,560,769	204,944	6,151,937
Total	149,046,792	2,091,616	17,943,420	351,134,430	3,943,588	34,931,[illegible]

These figures represent the estimated economic impact on the industry as of 2/11/77. The totals do not include the following credits allowed for dust control systems purchased by the industry before 2/11/77:

Towards compliance with 0.5 mg/m^3 VE $\bar{X}$ standard-opening = $12,151,541, picking = $5,685,038, carding = $32,333,474, drawing = $210,441, Total = $50,380,494.

Towards compliance with 0.2 mg/m^3 VE $\bar{X}$ standard-opening = $10,693,356, picking = $5,002,834, carding = $28,453,457, drawing = $185,188, Total = $44,334,835.

EXHIBIT 69

Statement of L. K. Fitzgerald

* * * * *

The pertinent portions of the RTI summary table, then, are:

Table I-6. Total Installed and Annualized Compliance Costs: All Sectors
(Costs in Millions of Dollars)

Industry Sector	Exposure Limit (mg/M3)	Installed Cost	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
Cotton Ginning	0.2	292.2	47.0	13.2	30.3	90.4
Yarn Production	0.2	984.4	158.3	15.6	67.9	241.6
Cotton Weaving	0.2	1387.9	223.1	40.7	86.3	350.1
Total	0.2	2664.5	428.4	69.5	184.5	682.1

It is suggested that an addition needs to be made to the capital requirement in the foregoing table, since the data is based on the assumption that the industry is already in compliance with a 1.0 dust level. This is not the case, according to the IIS. On page V-8, the IIS indicates that a capital expenditure of $143.3 million is necessary to bring the industry into compliance with a 1.0 level. This sum will have to be expended by the industry, in addition to that listed in Table T-6.

* * * * *

The $143.3 million represents additional equipment costs, and obviously this equipment will require Direct Operating Cost and Energy Cost, just as does the capital equipment considered in Table I-6. Therefore Annualized Compliance Costs will be recalculated. Annualized Capital Charge, Direct Operating Costs and

Energy Costs are assumed to increase proportionately to the increase in Installed Costs of compliance equipment.

With this addition, Table I-6 would then become a new table, Table I-6-a, as follows:

Table I-6-a. Total Installed and Annualized Compliance Costs: All Sectors
(Costs in Millions of Dollars)

Industry Sector	Exposure Limit (mg/M3)	Installed Cost	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
Cotton Ginning	0.2	292.2	47.0	13.2	30.3	90.5
Yarn Production	0.2	1127.7	181.3	17.8	77.7	276.8
Cotton Weaving	0.2	1387.9	223.1	40.7	86.3	350.1
Total	0.2	2807.8	451.4	71.7	194.3	717.4

From this table, total annualized costs of the Yarn and Weaving Sectors are seen to be $717.4 million instead of $682.1 million from Table I-6.

The Inflationary Impact Statement points out, and reiterates, that the capital requirement for the equipment necessary for a 0.2 dust compliance presents a problem of some magnitude. The IIS also makes the point, correctly, that the annualized capital charge is by far the largest component of total annual cost.

* * * * *

Since, admittedly, there would be considerable difficulty in capital formation at the level required by the 0.2 dust standard, it is not unreasonable that the industry would use the shortest available asset life to increase cash flow. Thus, the ATMI suggests that a 9 year life be used in the foregoing formula, instead of 14 years. When this is done (by the ATMI economist),

the annualized capital charge rate becomes .19864 instead of .16075.

Let us then go back to Table I-6-a and further revise the Annualized Capital Charge, by sectors, as follows in the new Table I-6-b.

Table I-6-b. Total Installed and Annualized Compliance Costs: All Sectors
(Costs in Millions of Dollars)

Industry Sector	Exposure Limit (mg/M3)	Installed Cost	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
Cotton Ginning	0.2	292.2	58.0	13.2	30.3	101.5
Yarn Production	0.2	1127.7	224.0	17.8	77.7	319.5
Cotton Weaving	0.2	1387.9	275.7	40.7	86.3	402.7
Total	0.2	2807.8	557.7	71.7	194.3	823.7

Examination of Table I-6-b now shows the Total Annualized Cost, still using basic data from the Inflationary Impact Statement, to be borne by the Yarn and Weaving sectors, to be $823.7 million instead of $682.1 million.

At this juncture, we feel it would be helpful to OSHA, in considering the impact of this cost increase, for us to examine it broadly in terms of other data for the Yarn and Weaving Sectors.

The IIS indicates that during 1972 (the only year for which this data is given) the six SIC codes which made up the Yarn and Weaving Sectors, processed 3,836.9 million pounds of cotton. (Table VI-2). Without going through the exercise of allocating compliance cost between various sectors, and of subsequently relating it to individual sector throughput let us simply

look at total dollars of compliance cost versus total pounds processed. The 3,836.9 million pounds of cotton processed by these sectors will have to bear an annual compliance cost of $823.7 million. This works out to be an average of 21.3 cents per pound, added cost.

There is no industry figure which will correctly identify the average yarn count being manufactured. It has been estimated variously between 18/1 and 24/1. I don't know what it is, but I estimate it to be somewhere around 20/1. Precise identification is not really important to the purpose at hand.

I have access to the variable labor costs for producing twelve different years, in typical mills, ranging from 18.5/1 to 24.0/1. The actual labor costs, from stock opening through the winding of spun yarn, average 15.95 cents/pound.

Likewise, I have access to variable labor costs for weaving yarns of the same count range into fabric in typical plants. Thirty-three different fabrics have an actual average weaving cost of 13.80 cents/pound. The term "weaving cost" embraces all processes incurred from wound spun yarn through the inspection of woven cloth.

Adding these two labor costs, there is a total of 29.75 cents/pound for woven fabric. I do not represent this as being an absolutely correct variable labor cost, for all fabrics, for all plants, but it is the best approximation I can put together, and is sufficiently good for the purpose at hand.

If we compare the average added compliance cost of 21.3 cents/pound, with an average labor cost of 29.75 cents/pound, the compliance cost is seen to be in the order of two-thirds—I repeat, two-thirds—of the labor costs for producing fabric. I do not doubt that differing labor costs could be established, and that they could show compliance costs to be anywhere from 50 to 75% of ex-

isting labor costs. The impact of the increase is of such magnitude that any figure in the 50 to 75% range is awesome to consider.

It will now be instructive to examine the $823.7 million revised annual cost increase in light of the earnings of the sectors involved.

In Table VI-5, the IIS indicates that the annual value of shipments of six SIC sub codes was $12,606.8 million in 1972. In Table VI-7a, and in the discussion immediately preceding it, the document concludes that profit on sales, for the entire textile industry, was 2.5% in 1974. However, since the value of shipments and the cotton consumption data used in the IIS, are from the year 1972, subsequent calculations should and will be made within that one year. Actually, return on sales for the entire industry was 2.56% in 1972, which is not materially different from the 2.5% quoted by the IIS in 1974.

The "value of shipments" for the entire textile industry was $28,071.5 million for 1972, and "sales" reported for that same year were $25,616 million. It is assumed that the 2.56% return on sales is equally applicable to the value of shipments.

While the after tax profit on the value of shipments of the six SIC sub codes is not known, some means of estimating it is needed for a comparison to be made between after tax profit and compliance costs.

If the return on shipped value for all of the twenty-nine SIC textile sub codes is 2.56%, the return for the six sub codes in question could reasonably be assumed to be between 2.0 and 3.0%. On that basis, earnings on the $12,606.8 million of shipped value were in the range of $250-375 million. Using either earnings figure, the added annual 0.2 cotton dust compliance cost of $823.7 million would throw these six sectors into an annual loss in the order of half a billion dollars.

The IIS suggests that price increases will provide the solution. For example, Table I-9 calculates that cotton weaving mills would find it necessary to increase selling prices 17.8% to retain their pre-compliance return on investment. The 17.8% increase is understated, since the actual 0.2 compliance costs, calculated by the ATMI from the IIS base data, are somewhat greater than those used in arriving at the 17.8% figure. Perhaps, another percent or so should be added on—I have made no effort to calculate it, since it is highly debatable whether the consumer will pay for either an 18% or 19% increase.

Without involving ourselves in conjecture as to whether the consumer can or would pay an increase of this size, one effect of it is quite clear. Cotton's share of the market has been steadily declining, from around 70% in 1950 to around 30% in 1974, as seen in Table C-20. During the same period, according to Table C-23, the ratio of the price of manmade fiber to cotton has declined from around 1.25 to around 0.80. The message of these trends is evident.

You may be absolutely certain that cotton textile plants, faced with cotton dust abatement costs of the size indicated, will accelerate the move from cotton as fast as the consumer can be persuaded to further adopt manmade fibers. An 18/19% increase in the price of cotton fabrics versus no increase in comparable fabrics of manmade fiber, will supply much of the persuasion. This impact does not fall on the mills, but falls on the grower

From a third viewpoint, the capital requirement for compliance equipment should be viewed in the light of historic industry expenditure for new plants and equipment. In so doing, 1972 capital expenditures should be considered, again in the interest of using data from the same year throughput.

From the "Census of Manufacturers", Bureau of Census, the six SIC sub codes together invested $595.4 mil-

lion in new plants and equipment in 1972. Please compare this figure with the compliance capital of $2,515.6 million. This says that, based upon 1972, more than four years of the investment of these sectors will have to go into compliance equipment. Or to say the same thing in a different fashion, plants would make no investment in improved productivity, or in buying equipment to meet changing consumer demands for new products, for four years. The longer term implication of this is serious. In a worldwide, highly competitive, textile market, the longer term application of this is obvious.

* * * * *

OSHA was engaged in finalizing regulations for the abatement of both noise and cotton dust in the textile industry. Since each of these will have a profound effect on the economics of the industry, OSHA could hardly disregard the effect of either, in considering the other. The industry expected that and believed that OSHA recognized this fact and had been informed that Bolt, Beranek and Newman (BBN), the OSHA contractor for the noise study, had been retained by OSHA to put together a total economic impact analysis, combining their own noise abatement analysis with the RTI analysis of cotton dust abatement. The industry has been anxiously waiting for this final combined study of BBN, but has not yet seen it. We have now learned that OSHA has, after the work had started, *cancelled* the contract for the reason, according to David Bell of OSHA, as quoted in the Noise Regulation Reporter (BNA, March 14, 1977, p. A-15), that it was "not in the taxpayer's best interest." This is indeed curious as there are large numbers of taxpayers who are also consumers or whom the burden of the inflationary impact of both standards will, in large measure, ultimately fall. It is also curious in view of Bell's own indication that, based on BBN's analysis, the costs were "staggering." Since such an analysis is obviously of utmost importance, a brief one will be presented here.

The whole of the textile industry is not affected by a noise abatement program. Almost without exception, the impact is felt by the greige sector of the industry, which is made up of the selfsame six SIC sub codes that are affected by cotton dust abatement. It is essential to add the costs associated with noise regulation to those costs already examined in connection with dust abatement, if we are to understand what is being proposed.

BBN estimated that the capital cost to the textile industry for compliance with a 90 dBA standard was $1,157 million, and $2,467.6 million for an 85 dBA standard. The textile industry was in complete disagrement with BBN's estimate, and documented, in great detail, its reasons.

* * * * *

We can offer no factual cost data for compliance with an 85 dBA regulation, nor can anyone else, since major equipment replacement, not retrofit, is involved. The required replacement equipment does not exist—has not been designed. Suffice it to say that loom replacement alone could conservatively be placed at $13 billion for an 85 dBA level.

On the other hand, the attainment of a 90 dBA, as far as looms, spinning and twisting are concerned, would cost $2,478 million. This is the figure which the industry calculated, and presented to OSHA, with full and complete back up data. When this compliance figure was presented at the noise hearing, it was not challenged on cross-examination. The textile industry will adhere to the $2,478 million figure.

If we return to Table I-6-b, and pick up its totals, and add to them the capital costs incurred from compliance with a 90 dBA noise standard, calculating annualized capital charges in the same fashion, we arrive at the following tabulation, Table I-6-c.

Table I-6-c. Total Installed and Annualized Compliance Costs: All Sectors
(Costs in Millions of Dollars)

Industry Sector	Exposure Limit	Installed Cost	Annualized Capital Charge	Direct Operating Cost	Energy Cost	Total Annualized Cost
Cotton Dust Abatement	0.2 mg/M³	2807.8	557.7	71.7	194.3	823.7
Noise Abatement	90 dBA	2478.0	492.2	-0-	-0-	492.2
Total		5285.8	1049.9	71.7	194.3	1315.9

The total annualized cost of compliance is seen to be $1,315.9 million. This is the figure for which OSHA is solely responsible. This is the figure that the six SIC sub codes would have to meet, and which has to be explored in the light of previously developed data for this sector.

The six SIC sub code sections processed 3,836.9 million pounds of cotton in 1972. An added annual compliance cost of $1,315.9 million works out, therefore, to be an average increase in cost of 34.3 cents/pound. This compliance cost, per pound, is greater than the earlier quoted average variable labor cost of 29.75 cents to produce a pound of woven fabric. Can a labor intensive industry more than double its labor cost and survive?

It was developed that the after tax earnings of that portion of the industry in question were in the range of $250-375 million. An annual cost increase of $1,315.9 would put this segment in the red, by something like a billion dollars annually.

The IIS calculates that price increases of 17.8% would be required in the weaving sector for it to maintain its pre-compliance return on investment. Annual compliance costs for both noise and cotton dust are $1,315.9 million, 1.93 times as great as the $682.1 million figure used in

the IIS calculations. Admittedly, it is not correct to assume that price increases, to retain a given return on investment, vary directly with cost increases, as the IIS points out on page VI-37. Even so, and conservatively, if the 17.8% increase be ratioed upward by 1.93, it becomes an increase of 34.4%. It would be unwise to use this as a firm figure, but it appears reasonable to infer that prices for woven fabric would need to be increased within a 30/40% range. If you feel a need for a precise figure, I feel sure that the RTI would be glad to calculate one.

The six SIC sub codes invested $595.4 million in new plants and equipment in 1972, the year under consideration. A capital requirement of $4,993.3 million (excluding capital for gins) for noise/dust compliance means that for 8.4 years, there would be no investment in new plants and equipment.

The amount of capital available for investment, investment in whatever, is the sum of after tax earnings and depreciation. It would be helpful to OSHA's deliberations if we could make this data available for the six SIC sub codes, but it simply doesn't exist.

As one possible means of ballparking a figure, data from Table C-17 may be used. For 1972, this table shows, for the textile industry, that $0.05 per sales dollar is available for investment, with the IRS indicated as the source. This figure represents the entire industry, and not just the six SIC sub codes. I do not know if, for the six sectors, the figure should more correctly be higher or lower. But if we assume that the $0.05 per sales dollar be equally applicable for all industry sectors, then six SIC sub codes have available for investment $630.4 million, from a shipped value of $12,606.8 million.

From this standpoint, 7.9 years of all of the capital available for investment will have to go into abatement

equipment at the expense of any productive equipment purchases.

It is most interesting how closely the two time periods agree, 8.3 years and 7.9 years, when the one is derived from historic capital expenditure and the other from a calculation of capital available for investment. It would be prudent to use an 8 year period as that which we are facing.

OSHA understands this implication for the long term as well as anyone. It is inconceivable that OSHA would push an industry, which earns 2.5% on sales, half that of the all industry average, down this road. There is some amount of capital that is useable for noise and dust abatement. I don't know how much it is, but it most certainly is not all the capital available, for all purposes, for the next 8 years. OSHA is faced with the problem of deciding how much of either of the abatement programs it wishes to mandate. The simple fact of life is that OSHA can't have all of both.

* * * * *

The time period granted for compliance is most important. The IIS makes the point quite clearly, when it states, on page VI-48, "The evidence in Table VI-11 clearly indicates that unless the compliance capital investments are spread over a substantial number of years, all the companies engaged heavily in cotton yarn production will face severe difficulty in financing compliance capital for the 0.2 mg/M^3 and the 0.1 mg/M^3 exposure limits, and the difficulty will be more intense for the smaller companies."

We don't know what OSHA's final decision with regard to dust level standards will be, and consequently don't know how much dust control equipment will be required. However, OSHA needs to remember that dust control

equipment suppliers have a limit to the quantity of equipment they can supply annually. I am told that the largest year of sales the cotton dust control industry ever had in this country was $12 million. I would expect these people to increase their delivery capability by perhaps two, or three times at the very outside. I doubt that new suppliers will come into the picture to any consequential degree, since once the needed equipment was supplied, the demand level would be too low to support added suppliers. If we assume that delivery capacity will go up to $30 million, and that optimistic assumption will require a lot of doing, delivery will require five years for the dust levels proposed by the ATMI, and more than eleven years if OSHA should require a 0.2 level in opening/carding.

* * * * *

The installation of automatic feeding equipment in cotton opening rooms, versus manual feeding, has begun in the industry, and over a period of time, more and more plants will make these installations, whenever they become economically and technically desirable. It is doubtful that OSHA is prepared to mandate the automation of all cotton opening rooms to eliminate the manual handling of cotton. These systems are expensive. If OSHA is actually seriously considering mandating this route, we are in a whole new, and as yet undetermined ball game of cost.

Picker tenders normally remove "picker laps" from picking machines and place them on trucks or conveyors, in the performance of their assignments. Is OSHA prepared to mandate the elimination of the picking process?

Card tenders manually remove picker laps from trucks or conveyors and place them into the feeding position at the card. What does OSHA propose here? Is OSHA saying that the chute feeding of cards, which will eliminate manual lap handling by both picker and card tenders, will be mandated? We are really in a new ball game of costs, if that be OSHA's intention.

With no effort to produce a refined cost figure for automated opening, cleaning and chute feeding, let me give you an approximate capital cost.

Assuming the correctness of Table B-13 in the IIS, there are 15,796 high speed cards producing 100% cotton and 9,030 high speed cards on cotton blends. If half the cards on blends be occupied by cotton, then there are 20,311 high speed cards producing cotton. Using the same procedure, from the same table, there are 16,224 cards of conventional speed being operated on cotton.

The first step in the installation of chute feeding is the conversion of conventional speed cards to high speed, or their replacement with new high speed cards. Conversion costs are in the order of $12,000 per card and new cards, depending upon the supplier, are around $30,000. An average of the two, since both courses would be followed by the industry, approximates $21,000.

With an optimistic ratio of 4:1 productivity, high versus conventional speed, 4,056 card conversion/replacements would have to be made to the existing 16,224 conventional speed cards. This comes to be $85.2 million.

The existing 20,311 high speed cotton cards, plus the 4,056 conversion to be made, total at 24,367 cards. The IIS estimates, on page B-71, that 5,000 high speed cards are chute fed. A portion of these are actually processing manmade fiber, but in the interest of conservatism, assume that all 5,000 chute feeds are applicable to highspeed cotton cards. This leaves 19,367 to be chute feed equipped.

In considering automated opening, the ATMI estimates that 5% of the high speed cards producing cotton are supplied from automated opening room bale feeding systems.

But in the interest of conservatism, let's double the figure, and assume that 10% of the new high speed cards are so supplied. This works out at 1,580 cards, which when deducted from the 24,367 cards under consideration, leaves 22,787 to be supplied from automated opening rooms.

One of the major suppliers, the one referred to by RTI, has supplied me with recent and typical quotes for chute feeding and for automated bale feeding and opening. On a per high speed card basis, the costs quoted are $10,500 for chute feeding and $23,250 for opening room automation.

The installation of chute feeding on 19,367 cards comes to be $203.4 million. The installation of automated opening to supply 22,787 cards comes to be $529.8 million.

The summation of card conversion/replacement, chute feeding and automated opening is a total cost of $818.4 million. This figure is not represented as being perfectly correct, but it unquestionably is the right order of magnitude. This is the background of having said that if OSHA is considering mandating the elimination of manual stock handling, it is a whole new ball game.

* * * * *

EXHIBIT 78

Submission of Amalgamated Clothing and Textile Workers Union

* * * * *

D. *Technological and Economic Feasibility*

The Secretary has based the proposed permissible level of dust and the seven-year delay in its effectuation on the *Technological Feasibility Assessment and Final Inflationary Impact Statement* prepared by the Research Triangle Institute. [18] This document starts out with the premise that "process modification, other than improved maintenance, has had little effect on dust concentrations" in yarn production. [19] Consequently, the RTI statement assumes that "the capture and removal of dust from the air at the point of generation (i.e., local exhaust ventilation) appears to be the most efficient method of dust control at the present time." [20]

The fact is that the RTI premise is wrong. Process modification has had a major effect on dust concentrations in yarn production. Indeed, those textile companies which have substantially reduced dust levels in their plants—and there are many which have done so—have relied primarily on the more modern machinery which has become available in recent years to accomplish their goal at a small fraction of what it would cost by means of the strategy assumed by the RTI, i.e., the use of retrofitted ventilation devices.

The high costs of compliance projected by RTI—and the delay associated with the incurring of such costs—flow from the assumption that the industry would choose the most costly strategy instead of the most efficient. A review of the record of what the textile industry has actually been doing will demonstrate the error in the RTI approach. Many companies have recognized the cost-effectiveness of combining dust reduction with mod-

ernization. Savings from the higher productivity yielded by more advanced technology are frequently greater than the increased capital costs and therefore result in actual reductions in unit costs.

1. *A Systems Approach to the Problem*

As noted by E. M. Afify, "the various measures and efforts taken by the textile industry to combat the dust problem . . . are far from being systematized." [21] In order to provide a unified approach to the task of dealing with the cotton dust problem, Afify has developed a set of guidelines based on "the systems approach being successfully applied in another pollution control field." He presents a flow diagram which throws light on the procedures and factors involved in assessing the feasibility of engineering controls for cotton dust.

The starting point in this analysis is the survey of dust concentrations "to identify the problem areas" and "to determine the state of knowledge of the dust emitted." [22]

Once the required information on the dust concentrations has been obtained, "the next step is to find out the possibility of altering the process to suppress the dust at the source . . . If neither the dust-concentration is smaller than the threshold limit set by OSHA nor the modification of the process turns out to be economically feasible, other channels of approach should be tried . . . The second channel of approach considers the possibility of modifying machine design to suppress the cotton dust at the source . . . The aforementioned approaches are basically elimination techniques . . . It is also worthy of note that *they must be applied to their limit first, whenever possible, before any control method be considered as they tackle the roots of the dust problem at the source before it spreads into the environment.*" [23] (Emphasis added)

It is not until the possibilities for process modification and changing machine design are exhausted that the "third avenue of approach" is suggested, which is "to find out if local ventilation can be installed as close as possible to the source to control the dust." [24] (The text of Dr. Afify's article is attached as Appendix 5.)

This sequence makes sense. Elimination of the dust before it enters the workers' environment is surely preferable to attempting to capture and remove it after it has been emitted into the environment. As noted by Hagopian and Bastress, "it is our observation that engineering controls in the form of ventilation systems and jerry-built enclosures can often be found about operations or processes which would not have required such 'add-on' devices if they had been properly designed in the first place. An underlying concept in many of the recommendations made in this report has therefore involved the provision of that technology necessary for the design of processes which do not require such controls by virtue of the fact that they do not result in excessive exposures . . . With today's costs of air cleaning equipment, ducting systems, and energy, elimination of the problem would probably be cheaper than attempting to control it . . . It is our belief that this sort of basic approach to developing 'engineering control' is the most correct one . . ." [25]

2. *Process Modifications and Machine Design Changes in the Industry*

The following technological advances have been implemented by many firms in the textile industry in recent years as part of the program to reduce cotton dust in the mill areas posing the most serious health hazards for textile workers:

(a) *Opening*

Automatic opening of bales of cotton and automatic feeding of cotton into the blending process have been substituted for manual opening and feeding.

(b) *Picking*

This process has been eliminated by feeding of stock directly from opening to carding in enclosed chutes.

(c) *Carding*

Stock is chute fed into the carding machine, which is either fully enclosed or has built-in air cleaning to minimize dust emission.

(d) *Spinning*

Open end or rotor spinning frames have replaced ring spinning frames. The new frames eliminate the need for roving and winding. The spinning is performed in enclosed rotors with built-in suction to minimize dust emission. This process has not been found suitable for all types of cotton yarns but it is presently producing yarns ranging up to 24s.

The RTI statement makes reference to these developments. It notes that "many of the modern machines are well enclosed and are equipped with dust capture devices as a standard feature." [26] However, in assessing the compliance costs for yarn production equipment, RTI fails to take into account the lower air flow requirements for the more modern machines. For example, the projected incremental costs for complying with target dust levels are the same for Open End Spinning Frames as for Ring Spinning Frames.[27]

The most serious deficiency in the RTI assessment is the assumption of a static state of technology. RTI simply assumes that the distribution of machinery in place as of the date of its survey (1973) would remain exactly the same in the future. No effort is made to

factor into the cost calculations the effects of existing or prospective technological improvements.

This failure is specially deplorable in view of the information readily available to RTI in the cited sources. One of these sources (*Technological Obsolescence in the Textile Industry*, prepared for the ATMI Tax Committee by its sub-committee on Technological Obsolescence, August 1974) furnishes the following information relevant to the RTI assumption of a static technology:

> "Rapidly increasing labor costs and scarcity, particularly in the last three years, have forced manufacturers into a fresh look at those technological developments which can contribute to a smaller workforce. It is difficult to quantify this effect, but it has been substantially larger in the last three years than in any earlier period, and in the half dozen years ahead, the pace of adoption of new technology for labor saving must accelerate." (p. 1)

"*Opening and Cleaning*

> "Development of systems to eliminate feeding of stock into hoppers by hand had met with little success until recently, however, there are now some 6/8 companies offering these systems." (p. 5) (The "automatic bale plucking systems" and "improved cleaning equipment" are attributed in the ATMI statement to "technological obsolescence" and the need to comply with government regulation. ATMI assesses the influence of the automatic opening as "major" and the improved cleaning equipment as "mid" or medium importance.) (p. 6)

"*Picking*

> "Other than maintaining existing pickers it is not anticipated that any significant capital expenditures will be made on pickers in the coming years as it is

anticipated that this manufacturing process will be eliminated by the chute feeding of stock directly from opening to cards." (p. 6) (The introduction of the Chute Feeding System is attributed to "technological and economic obsolescence." The ATMI characterizes the influence of this new system as "major.") (p. 7)

"*Cards*

"Of the 20,000 high speed cards which are in operation, 5,000 are chute fed, and this represents 17/18% of the productive capacity of the industry . . . most of (the investment in chute fed cards has) occurred within the last three years. This trend will have to continue, and those plants which run fairly constant fiber blends (as opposed to a highly-styled, fancy carding operation) will, without question, advance to chute feeding." (p. 8) (The reasons for the change to chute fed cards are given as "technological and economic obsolescence." The influence of this change is termed "major" by ATMI.) (p. 9)

"*Roving*

"The advent of the open-end spinning system has placed some question mark on the future of the roving frame, however, at this point, it is difficult to ascertain to what degree it will be affected . . . Because of the possibility of the roving process being eliminated by open-end spinning, we do not anticipate any substantial developments in this area." (p. 14)

"*Open-End Spinning*

"Basically, the open-end frame is supplied with sliver from a draw frame (obviating the need for a roving frame), passes sliver through a drafting systems into a centrifugal rotor and, thence, to a

wound package (obviating the need for a subsequent winding operation). For yarns in the coarser counts, unquestionably, there is cost improvement and reduced labor need. However, the yarns produced are different in characteristics than conventional ring-spinning yarns, usually requiring redesign of the end product. Open-end spinning is having an important impact on conventional ring spinning, but it will by no means obsolete ring spinning for many years to come, if ever. . . The open-spinning concept lends itself beautifully to the complete systems approach. This says that if a completely automated system (now available) be installed, from raw bale through finished sliver, and if open-end spinning be installed to operate from sliver, through winding, there then would be two basic processes which would replace eight conventional processes. It would appear inescapable that, for certain end products, the industry would go this route, but it is most difficult to predict the rate at which this will happen.

"As of today, there are in place and in operation 73,160 spindles of open-end spinning, and 95,592 spindles are presently on firm order for delivery during the remainder of 1974, and 1975/1976. Thus, through 1976, there will have been delivered 168,792 open-end spinning spindles into this country . . . To date, the open-end spinning that is in operation, together with that available for delivery in the next two years, is limited in capacity to 1″ to 1½″ fiber lengths, generally, with a small portion have the capability of up to 2″. The industry has been demanding longer staple capability for many end uses, but as yet, only prototype or mill-trial equipment is available. Again, this modification should be available in mid-1975 for mill installation . . . Without exception, all of the major machinery manufacturers

are in process of stepping up their rates of production of this particular equipment, and the best estimate available is that, in the several years after 1976, open-end spinning will come into the country at approximately 60,000 spindles per year, which is at a rate of $60,000,000, annually, for that period." (p. 16-17) (The reasons for the development of Open-End Spinning are "technological and economic obsolescence." ATMI assesses the influence of this development as "major." It projects "future developments (next 5 years)" to include "Open-End Spinning from Card Sliver," a "major influence" which would replace the Drawing process. (p. 18) ATMI also projects "Long Staple Open-End Spinning" in the next 5 years, with a "major influence" in replacing Ring Spinning through an extension in the yarn counts suitable for processing under the new system. (p. 18)

The above-cited ATMI report was prepared in response to a request by the Office of Industrial Economics, U.S. Department of the Treasury which announced a study of the textile industry in April 1974 as part of its evaluation of the existing asset depreciation system. The facts developed by the industry were further supported by a report by W. D. Cooper which the Department commissioned.[28]

Cooper's study confirms the fact that "during the 1960's and 1970's textile machinery advancements have been accelerating and are expected to continue into the 1980's." [29]

Cooper finds "marked productivity increases across the board" in Opening through Spinning processes during the 1960-1970 period.[30] "During the late 1960's and early 1970's" he reports "the trend in the card room was towards high production carding, chute-fed materials, a reduction in card room and blow room personnel . . .

(M)uch of the new chute-fed carding equipment purchased during the 1967-1973 period was imported, and because import data lumps all yarn preparation machinery together, it is difficult to measure the impact of imported carding during this period." [31]

Among the "major post World War II technological changes" identified by Cooper, "non ring-spun yarns" are anticipated to have "a profound effect as a substitute technology for conventional ring-spun technologies . . ." [32] In 1974 the market for yarns suitable for production by rotor open-end yarns represented a potential 1.3 million open-end positions, or about 17 percent of the U.S. yarn market. One open-end machinery manufacturer estimated that the number of open-end positions in the United States would grow from 46,544 at the end of December 1974 to 230,000 positions in December 1976 but Cooper judged this as "probably too high a forecast due to economic conditions of 1974-75." [33]

The Treasury Department's investigation of textile technology yields the following data relevant to the present proceedings:

> (1) A sample survey taken of textile companies with 45% of the textile industry's total assets projected 1975-80 capital expenditures in the Yarn and Thread areas to comprise 29.6% of the total of such expenditures, compared to 10.4% and 9.8% in the 1958 and 1972, respectively.[34]
>
> (2) ". . . the projected growth in yarn formation machinery probably means many companies are investing in open-end spinning equipment. At present, open-end spinning machines still have some limitations in yarn deniers but have high production capabilities and are labor saving. Open-end spinning combined with a completely automated fiber opening and carding system can replace eight conventional

processes with two. The obvious savings in labor which is reportedly hard to obtain, is probably a major reason why a significant increase in yarn formation investments are being forecast." [35]

(3) "OIE believes . . . that it must consider such items as the sources, availability, and requirements of capital in determining the expected future asset retention and repair practices of an industry or activity.

"In the above context, a shortage of capital funds might indicate that an industry, such as the textile industry, might not replace certain assets as rapidly in the future as it has in the past. Conversely, the need to meet OSHA and EPA standards might force the industry to replace other assets more rapidly than in the past.

"Therefore, capital requirements, availability, and sources were additional factors utilized in the determination of the recommended guideline depreciation periods and the guideline repair allowance percentage." [36] (It should be noted that the Treasury Department in 1976 reduced the guideline period for Class Life Asset Depreciation for yarn, thread and woven fabric assets from 14 years to 11 years as a result of this study, with a permissible range of 9 to 13 years.)

(4) "Over the past eight years open-end rotor spinning was perfected for selected yarn counts. Mills which installed these new spinning machines as part of a completely automated system replaced eight conventional yarn formation operations with two. Also, depending on the type of yarn count manufactured, open-end rotor spinning produces two to five times more yarn per pound per machine than conventional ring spinning. As a result, yarn mills are reported

to realize substantial savings in labor, floor space, production time per unit, time and quality control . . . machinery manufacturers are reportedly increasing their capacity to produce such machines . . . The demand in open-end rotor spinning machines will continue for the next ten years and is expected to account for more than one-third of the spun yarn output by 1985. This trend is corroborated by OIE's survey which reports major investments in yarn formation machinery and equipment over the next five years." [37]

(5) The weighted average life of depreciable assets used to manufacture spun yarn and thread is projected to decline from the historic level of 17.83 years to 8.80 years, according to the Treasury Department survey of the industry.[38]

(6) "A 20% reduction in the asset guideline period for this class is mainly justified by placing a major emphasis on events which will continue to force weavers and spinners to make substantial replacements of outmoded machinery with more modern equipment and processes . . . This change to the newer technology is reflected in the tripling of anticipated investment in yarn and thread manufacturing assets over the next five years, implying substantial replacements over the near future. The rate of change to the new technology is also expected to accelerate as new and better open-end spinning machines are introduced in the market place. . . Other investments are also anticipated for enclosed chute fed fiber systems. . ." [39]

It is evident from the above reports by the ATMI, the North Carolina State University School of Textiles and the U.S. Treasury Department that significant process modifications and machine design changes are expected to have increased impact in the immediate future, par-

ticularly in relation to the need for complying with government dust standards.

3. *Data from OSHA Compliance Inspections*

In order to obtain additional information on the role which advanced technology has been playing in the task of reducing dust emissions in textile mills we have made inquiries of OSHA at both the federal and state levels. At our request Mr. Cois M. Brown, Assistant Regional Administrator in the Atlanta regional office of OSHA, has furnished us with a report on eight cases of textile plants which have been the subject of compliance inspections by area offices of OSHA. Since these cases are involved in various stages of the enforcement process, Mr. Brown declined our request to identify the companies involved. A copy of Mr. Brown's letter of January 27, 1977 with enclosed reports on eight cases is attached as Appendix 6.

Of the eight reported cases, three have not been subjected to follow-up inspection so the results are not possible to evaluate. (Cases 2, 3 and 4) In two cases, follow-up inspections reveal reduced dust levels but abatement efforts are still under way (Cases 5 and 6).

In the three remaining cases (No. 1, 7 and 8) full compliance with the present standard has been achieved. It is noteworthy that in each of these three cases process modification or machine design change has played a significant part in achieving compliance:

> In Case No. 1 the installation of chute-fed cards eliminated the picking operation (with dust levels of 3.5 and 3.38 mg/m^3 OSHA personal samples.) The resulting dust levels in Carding (0.42 and 0.36) are equivalent to approximately 200 ug/m^3 vertical elutriated dust.

In Case No. 7 controls implemented prior to OSHA inspection include direct feeding of stock from Opening to Carding, chute-fed cards and open-end spinning. The dust levels recorded in carding and spinning (0.38 mg/m^3 and 0.13 mg/m^3 respectively) are well within the proposed limit of 200 ug/m^3 vertical elutriated dust.

In Case No. 8 controls implemented prior to OSHA inspection included "sufficient enclosure of (carding) machine to aid in dust collection." The dust level reported in carding (0.85 mg/m^3) is well below the present standard of 1 mg/m^3.

The above data compiled by the Atlanta regional office of OSHA provide further support for our observation that the failure of RTI to make provision for including process modification and machine design changes among the means of achieving compliance with the proposed standard represents a serious error.

Further evidence to demonstrate this point is submitted in Appendix 7 (Process Modifications and/or Machine Design Changes Reported at Plants Inspected for Cotton Dust by North Carolina Occupational Safety and Health Administration.) The plants covered by these reports vary from small to large, from independent yarn mills to integrated chains. They all share one characteristic: when confronted with the need to reduce dust to comply with the OSHA standard they have found advanced technology an efficient and economical means of meeting the challenge. It has been the Union's experience in dealing with companies with which we have collective bargaining relations that in case after case involving exposure to excessive cotton dust the most effective means of abating the hazard has been through process modification or machinery design changes.

4. *Data from Technical Reports*

As noted in *America's Textiles* magazine, "the chief stimulus for mill buying of preparatory and carding

equipment is dust control to meet OSHA standards . . . every time OSHA issues a citation to a mill for excessive dust, equipment builders receive a flurry of new orders for machinery and equipment to reduce dust." [40] However, abatement of OSHA violations is not the only motive:

> "The second most important stimulus is higher production and lower costs, especially by replacing lap-fed conventional cards with chute-fed high producduction cards to reach production rates of 50 to 60 pounds per hour.
>
> "In most mills, these two results, dust control and lower costs, are obtained in a single move . . ."

It is evident from a review of the journals dealing with developments in textile technology that the firms which have adopted advanced technology to abate dust problems have reaped the benefits of cost reduction and quality improvement as well. The following excerpts from representative articles, which are attached as appendixes, illustrate the nature of the savings involved:

> *"Mill Men Stress Spending in 'Basics'*
>
> "Mill officials point out that in many cases it is impossible to differentiate between environmental and non-environmental equipment spending. Investment in chute fed, high speed carding, in drawing, in automatic fiber feed systems in the opening room where the process of transferring raw cotton and synthetic fibers into hoppers have been mechanized, has been made with an eye as much to production and quality as to the environment." (Appendix 8)
>
> *"New Bale-O-Matic System Reduces Dust Level*
>
> "It is reported that with the cost reductions and improved quality due to blending, the complete Bale-O-Matic System can show a 25%-30% return on investment." (Appendix 9)

"*Preparing and Carding 1975*

"Both chute feeding and enclosed high production cards began as economy and labor availability moves. But the impact of OSHA dust and fly control requirements has pushed this consideration to the top." (Appendix 10)

"*OSHA Cotton-Dust Standard a Time Bomb for Textiles*

". . . in opening and carding, mills have been able to gain some production advantages in most cases while cleaning up the air. In going to high-speed carding with air-return systems, they have gained production while reducing costs." (Appendix 11)

"*OE Flood The Mills*

"Conventional estimates are that OE Spinning can reduce the man-hour requirement in yarn preparation by half to a third compared to ring spinning. The labor saving results from elimination of at least one processing step, roving; a reduction in doffing frequency . . . and in some cases elimination of rewinding.

"In addition, an all-OE spinning plant is noticeably cleaner." (Appendix 12)

"*Energy Questions in Spinning*

"The overall costs in OE spinning are nearly 5% lower than in ring spinning (Tables I and II)." Table I shows the cost of ringspinning 1-inch staple length, 50 tex (Nm 20 = Ne 12) as 1.568 Swiss francs per kg. Table II shows the cost of OE spinning of the same yarn as 1.494 Sw. fr. per kg. (Appendix 13)

It is evident from the above that it makes economic sense for textile companies to utilize the best available

technology to meet the OSHA cotton dust standard. Firms that have been the subject of enforcement actions have had a pressing reason for doing so. Moreover, a number of companies have made public announcements reflecting recognition of the fact that a progressive policy of modernization is in the financial interest of the company as well as in the interest of protecting worker health.

5. *Data from Company Reports*

Burlington Industries, Inc., the largest textile firm in the country, announced in its 1976 Annual Report that "concern for our employees' health can be seen in investments the company makes that modernize our plants and also increase productivity. Major installations of chute-feed cards have been made throughout the company to reduce the dust that previously resulted from the opening and blending of fibers." The company added the following announcement:

> "To eliminate the dust usually present in the opening of cotton bales, automated cotton handling equipment and chute-feed cards have been installed at many plants. By 1980 all of Burlington Industries' spinning operations should be equipped with these modern dust control devices." (Appendix 14).

A medium-size textile company (Russell Corporation, with sales of $103 million) made the following observations in its 1975 Annual Report:

> "Russell's ongoing plan improvement program is designed to introduce new technology into the production facility as it becomes available, to improve productivity, lower costs, improve customer service and product quality, and maintain the flexibility of the plant. Management believes it is the responsibility of American industry to keep pace with ad-

vancing technology to remain competitive in domestic and world markets. Plant improvements are also intended to improve environmental conditions for employees and the community.

"During 1975, the automation of card rooms at two of the Company's yarn manufacturing plants was completed. This streamlining included automatic opening and chute fed cards, resulting in virtually dust-free working conditions. New open end spinning frames were also added at the Coosa Plant, increasing productive capacity by 25 per cent, while reducing costs." (Appendix 15)

The following excerpt from a smaller textile company (American and Efird Mills) makes a similar point succinctly:

"The planned capital expenditures of $3,405,000 for fiscal year 1977 and $1,981,000 for fiscal year 1978 are primarily for improvements in sales yarn operations, which will increase productivity, meet certain OSHA dust standards and achieve significant labor savings in the manufacturing process." (Appendix 16)

Inasmuch as the more modern processing equipment is designed to achieve maximum enclosure and generally incorporates built-in cleaning devices which minimize dust emissions, the levels of dust to which employees are exposed can be readily controlled. Thus, Dr. Harold R. Imbus, Burlington's Medical Director, reports that the average dust level in the carding department of a spinning plant he studied declined from 2.06 mg/m^3 elutriated dust before installation of chute-fed cards to 0.315 mg/m^3 afterwards. In fact, he reports that the latter level "is an average of the two areas in the room," i.e., areas in which some of the old and the new cards were operating. According to the author, "further reductions

in dust will occur when the (chute-fed card) installation is complete." [41]

In another plant reported in the same study, Imbus finds a range of 0.07-0.93 mg/m³ of elutriated dust in a card room with "modern cards of chute feed type." While no time weighted average is reported the exposure is characterized as "generally between 0.2 and 0.5 mg/m³." It is also noted that "a rather low grade of cotton is used." [42]

Similar findings are reported by Neefus in a study of dust monitoring with a vertical elutriator and the GCA dust monitor.[43] He reports the following comparisons of dust levels between Old Cards and Chute-fed Cards using the GCA:

	Plant A		Plant B	
	mg/cu m	(n)	mg/cu m	(n)
Old Cards	0.44	(4)	0.87	(3)
Chute-fed Cards	0.19	(4)	0.66	(3)

He also reports on an effort to "evaluate whether open-end spinning was as dusty as ring spinning." The following data are given for a spinning mill using 50/50 polyester/cotton:

	Open-end Spinning	Ring Spinning (VE)
	(mg/cu m)	
$\bar{x}$	0.19 (n=8)	0.28 (n=42)
x_m	0.17	0.17

Neefus reports that the correlation coefficient between the vertical elutriator and the GCA is quite high ($r = .87$) and that the two agree up to 0.7 mg/m³. Consequently, the above comparison indicates a significantly lower dust level for open-end spinning. Indeed, the average dust level for open-end spinning is well within the proposed limit of 200 ug/m³.

6. *Data from Union Observations*

These findings are consistent with the observations made by the Occupational Safety and Health Director of the Union in May 1976 when he visited four plants of Burlington Industries, Inc. The Corporate Medical Director and the respective Plant Managers furnished us with the results of environmental monitoring (vertical elutriator and total dust) and reviewed the modernization programs which had been instituted in each of the plants. With the exception of occasional malfunction of particular equipment, it was noted that total dust levels in each department were within the present permissible limit of 1 mg/m^3.

The most striking fact noted in this survey was the correlation between advanced technology and the degree of dustiness. The Flint Plant (Gastonia, N.C.) which had been modernized most recently, had automatic opening and direct feeding to chute-fed cards, with effective built-in ventilation. Dust levels in this plant varied between 0.10 and 0.21 mg/m^3 elutriated dust, with only two of the 12 operating areas recording more than 0.20 mg/m^3.

Environmental monitoring of the other plants (Erwin, Mount Holly and Smithfield, North Carolina) provided management with an indicator of the areas where further technological improvement was required. The Plant Managers reported that the substitution of advanced technology had generally reduced unit costs of production since the new equipment was much more highly productive than conventional equipment. These reports were consistent with the information obtained in discussions of this subject with various other managements.

The cost-saving character of the new technology is further demonstrated by a report of the Kurt Salmon

Associates, a leading management consultant firm serving the textile industry.[44] This study shows that a cotton mill utilizing the latest technology in use as of 1975 would operate at a lower unit cost of production than a mill producing the same product on the basis of the 1967 technology, even after taking into account increased capital costs. Consequently the 1975 model mill would generate 12 percent more net profit and 66 percent more cash flow than the 1967 model.[45]

The text of the report by the Kurt Salmon Associates is attached as Appendix 17.

A research project currently under way at the Georgia Institute of Technology which has developed an improved packaging system for cotton, is illustrative of the technological potentialities which are on the horizon. Under this prototype system raw cotton has been packaged at the gin by means of vacuum densification so as to reduce "the exposure of workers to byssinotic agents" and to provide "simpler opening procedures which can be integrated with present pneumatic chute feed systems." [46] A copy of the 1976 annual report of this project is attached as Appendix 18.

Assessment of the feasibility of any standard must contain a degree of speculation. We are not privileged to foresee the future. The effort which the Research Triangle Institute made to do so was based on a set of assumptions. The critical assumption was that textile technology would remain frozen and that the industry would have to rely on retrofitted ventilation devices to meet the new standard.

We have demonstrated that this assumption is unrealistic in the extreme. It flies in the face of the actual experience of the industry in seeking to reduce dust levels to meet the existing standard. Technological advances which have automated the manufacturing processes and

enclosed the operations so as to minimize the emission of dust have been utilized before applying ventilation. In this way the cost of dust suppression has been offset by the savings from higher productivity. The task of meeting the proposed standard is therefore feasible in economic as well as technological terms.

* * * * *

EXHIBIT 78, APPENDIX 5

* * * * *

The starting point in this analysis is the use of the dust concentration survey carried out at the breathing zone of the operators to identify the problem areas in the cotton mill. Priority in the treatment of problem areas is given to the early stages of cotton processing areas where the dust-concentration level is the worst. This is due to the urgent need for correcting the situation and to the fact that any reduction in the dust concentration in this area may, in general, bring about corresponding reductions in most of the other problem areas.

* * * * *

EXHIBIT 78, APPENDIX 15

Excerpt from
Russell Corporation 1975 Annual Report

IMPROVING FACILITIES

Consistent with the Company's commitment to continuing plant modernization, a two-year $15,000,000 capital investment program was undertaken in 1975, with some projects completed in that year, and others scheduled to go on stream during the current year.

Russell's ongoing plant improvement program is designed to introduce new technology into the production facility as it becomes available, to improve productivity, lower costs, improve customer service and product quality, and maintain the flexibility of the plant. Management believes it is the responsibility of American industry to keep pace with advancing technology to remain competitive in domestic and world markets. Plant improvements are also intended to improve environmental conditions for employees and the community.

During 1975, the automation of card rooms at two of the Company's yarn manufacturing plants was completed. This streamlining included automatic opening and chute fed cards, resulting in virtually dust-free working conditions. New open end spinning frames were also added at the Coosa Plant, increasing productive capacity by 25 percent, while reducing costs.

The weaving operation is undergoing modernization with the initial installation of new high speed wide looms, the first new looms installed in the plant since the 1950's. The new equipment will produce wide goods at increased speeds, improving both productivity and the diversity of end products. Installation of the new looms, under Phase I of the program, is underway at the date of this report.

The Company's two bleacheries are being consolidated in one location, reducing both operating costs and the expense of meeting environmental requirements. The consolidation will improve material flow and permit some interchange of equipment to accommodate the changing variety of products. All dyeing and finishing operations will be performed in one building, where knit dyeing and finishing capacities can be expanded as needed. An obsolete facility was vacated in the consolidation and its operations moved to the newer building.

A new wood chip fired boiler was completed and placed on stream earlier this month, providing substantial savings in fuel costs, plus decreasing the Company's dependence on scarce and expensive traditional fuels from outside sources. The area is rich in forest products and reliable supplies of wood chip products have been secured.

An important phase of the capital program is a new highly-automated distribution center, containing 250,000 square feet of warehouse and shipping facilities for finished products. It is designed to dramatically improve speed of customer order response, inventory controls, and production planning. The facility will be computerized and features the latest in automatic material handling equipment and systems. The center is scheduled for completion in the fourth quarter.

EXHIBIT 78, APPENDIX 16

AMERICAN & EFIRD MILLS

[Emblem]

Excerpt from 1976 Annual Report

Business

A & E is a major producer and merchandiser of sales yarns and sewing thread. Its yarn products include a wide range of combed cotton, synthetics and blends, worsted system and dyed yarns. Yarn is sold to weavers and knitters of both underwear and outerwear. Thread products include cotton, spun synthetic and filament threads which are sold to apparel, automotive, furniture, shoe and packaging producers throughout the U.S. and certain foreign markets.

The company's objective is to operate as an innovative, low-cost, diversified producer and marketer in both its Yarn and Thread divisions. It manufactures virtually all of its products which are sold through its direct sales organization.

Most aspects of the yarn business tend to be highly cyclical as dictated by fashion, a more limited range of customers and economic conditions. Thread operations are characterized by more consistent demand requiring greater service features to a number of large customers.

1976 Operations

A & E entered fiscal 1976 in an economic environment that showed marked improvement over that of the prior year. Sales in the first quarter were up 48%. This improvement occurred mainly in the thread operation where economic activity created a strong demand for these products. Record levels of sales and earnings in the

Thread Division continued throughout the fiscal year. While the Yarn Division showed significant improvement in both sales and earnings, not all plants operated at capacity for the entire year. This was attributable both to weakness in demand for some sales yarn and to mill modifications that were made in order to realign capacity for more emphasis on cotton and cotton-polyester products. Each succeeding quarter in fiscal 1976 produced an increasingly better result and as the year ended the Yarn Division was operating profitably and the Thread Division continued to perform at gratifying levels.

Capital expenditures completed during 1976 were for the expansion of core-thread capacity, the improvement of thread finishing, and the realignment of certain sales yarn plants to more profitable product lines. At the close of the fiscal year plans were underway to convert the unprofitable textured yarn operation to a filament processing plant for the Thread Division.

Outlook

Thread operations should continue its good performance in 1977. The efforts to concentrate sales with the larger accounts have succeeded thereby providing an increase in sales volume and a more predictable and continuous demand. This has allowed better planning, reduced inventories and overall has allowed for a more profitable operation.

Yarn operations, while greatly improved, continue to suffer from erratic demand. It is anticipated that yarn sales will return to more normal levels in the near future, resulting in further improvement in Yarn Division profitability.

The planned capital expenditures of $3,405,000 for fiscal year 1977 and $1,981,000 for fiscal year 1978 are primarily for improvements in sales yarn operations,

which will increase productivity, meet certain OSHA dust standards and achieve significant labor savings in the manufacturing process.

Employees 2500.

	(Dollars in Thousands)				
Five Year Summary	1976	1975	1974	1973	1972
Net Sales	$78,586	$52,943	$72,661	$69,426	$65,271
% Total Ruddick	27.9%	23.1%	32.7%	36.8%	37.7%
Operating Income (Loss)	$ 3,723	$(1,592)	$ 4,825	$ 2,600	$ 2,900
% Total Ruddick	37.6%	(34.8)%	47.6%	47.2%	48.8%
Average Capital Employed	$34,726	$33,714	$33,439	$32,369	$31,445
% Total Ruddick	58.2%	53.6%	62.3%	65.5%	65.7%
Operating Return on Capital Employed	10.7%	(4.7)%	14.4%	8.0%	9.2%
Depreciation	$ 1,869	$ 1,808	$ 1,733	$ 1,733	$ 1,660
Capital Expenditures	$ 2,263	$ 2,034	$ 998	$ 1,291	$ 3,238

EXHIBIT 79a

Summary Statement of Parker C. Reist and Lawrence D. Kornreich,

"The Impact of New Production Equipment on Control Costs to Meet the Proposed Cotton Dust Standard"

In preparing the proposed cotton dust standard, OSHA relied heavily on an inflationary impact statement prepared by the Research Triangle Institute. In this report, control costs were estimated by extrapolation to the dust concentration required from known control costs at higher concentrations. But it is possible that actual costs could be much lower if state of the art production technology is considered. Much of the production machinery now in use is quite old and was originally designed with little consideration for dust emission. At present dust emissions are considered in designing and installing production equipment. It is possible that with the modern machine designs and higher production rates now available, control costs to meet a recommended exposure limit of 0.2 mg/m^3 will be lower than estimated by OSHA.

We report on the results of a study of control strategies associated with new manufacturing equipment as compared to conventional manufacturing equipment. Most of the information that has been developed pertains to carding, although automatic opening devices are often associated with high speed cards. Less information is available which pertains to spinning.

There are two principal reasons why the cost of control should be lower if a mill converts to newer equipment: 1) The operating cost of new equipment with controls on that equipment is less than the operating cost of the old equipment with controls necessary for the older, slower equipment to meet proscribed dust levels; and 2) by going to newer equipment with controls there is

a liklihood that increased production rates will result in recovery of some or all of the capital cost of control. This would be impossible with controls just added to present production capacity.

Considering carding as an example, the amount of ventilation required for equivalent dust control between old and new production processes remains essentially constant while the production rate (pounds of cotton processed per machine per hour) rises with new and rebuilt machinery. This conclusion is reached based on surveys of production rates and air flow requirements for several cotton mills which have undergone card modification as a means of achieving lower dust levels. For these mills the range of air flow required per card varied from 800 cfm to 820 cfm while production rates varied from 18 lbs. per hour to 70 lbs. per hour. Thus it appears possible that replacement of older, slower cards by higher speed units will increase production without additional air volume requirements, or conversely, the same production rate can be maintained with significantly smaller air flows needed. This means a rather large savings in total volume required to achieve the same total production rate. We recognize that it is not always possible to use high speed cards for all grades of cotton. For example, high quality long staple cotton fibers can be broken with a reduction in cotton quality if carded with high speed cards. This high quality cotton, however, is the cleanest raw cotton available, and so presents the least dust problem. Serious dust exposures are more likely to occur when processing low grade cotton, which can be processed with high speed cards.

It is clear that there are some capital savings to be obtained by going to higher speed equipment in terms of less expenditure for control equipment. This is summarized in Table I and graphically illustrated in Figure 1, where it is seen that air volume requirements per pound of cotton decrease as the production rate increases.

Another possibility is that by utilizing higher speed equipment and increasing production rates some of the cost of control can be recovered, since additional capacity can be purchased by replacing old equipment with new equipment for a very small increment of cost. By strictly replacing older cards with newer cards, and only matching capacity, there is no possibility of obtaining any return on the investment made in new equipment plus controls.

Although the stimulus for making changes in production equipment is likely to continue to be changes in, or enforcement of, standards of exposure to cotton dust. There are other benefits that accrue to the mill from the change as well. The mill becomes cleaner. In all cases investigated of before and after studies in opening rooms, picker rooms, and carding rooms there was an improvement (often a dramatic improvement) in going from older equipment to new equipment.

We recognize that there are a number of factors besides equipment replacement which must be considered. Sometimes additional air conditioning is needed. Sometimes the plant layout needs to be modified as well, to minimize the passage of dust from one room to another. Nonetheless the net result has been a cleaner working environment. The impact of this cleaner environment on the overall product quality, coupled with any production changes that could cause changes in quality, is hard to assess. However, the pattern of new equipment use in major mills to meet dust standards suggests that utilization of newer, more modern equipment offers the possibility of many benefits for management while providing a healthy environment for the workers.

EXHIBIT 79c

Reist, *et al.*, "The Impact of New Production Equipment on Control Costs to Meet the Proposed Cotton Dust Standard"

Introduction

A number of studies in the United States and other countries have demonstrated that persons working with vegetable fibers, and especially cotton, develop an occupational disease characterized by shortness of breath, tightness in the chest and general respiratory insufficiency. The disease, which can be disabling, appears to be caused not by the cotton fiber or fly, but by finely pulverized cotton plant parts such as the bract. This cotton dust, which is entrained in the raw cotton by mechanical picking, is released during the processing of the cotton into textiles.

There is still debate as to a "safe" level of exposure to cotton dust. Early workers recommended a level of 2.5 milligrams per cubic meter (mg/m^3) for total dust and the 1966 American Conference of Governmental Industrial Hygienists TLV list recommended a value of 1 mg/m^3 total dust. More recently investigators have found closer correlation of disease prevalence with the middle size range of the dust rather than with the total dust (1,2) and samplers have been designed which sample this middle range. Since only a fraction of the total dust would be measured by these samplers, in 1972 the ACGIH Threshold Limits Committee proposed changing the LTV for raw cotton dust from 1 mg/m^3 total dust to 0.2 mg/m^3 of lint-free dust, as measured by the vertical elutriator (3). This TLV has been adopted by the ACGIH and is presently the recommended level (4). The current Occupational Safety and Health Administration standard is 1 mg/m^3 total dust, based on the ACGIH TLV of 1968.

There have been a number of criticisms of the studies from which these recommended levels arose, not only based on arguments of faulty epidemiology, but also based on arguments of excessive costs to meet these lower dust levels (5).

The purpose of this study was to investigate various control strategies associated with new manufacturing equipment as compared to conventional manufacturing equipment. Much of the production machinery now in use is quite old and was originally designed with little consideration for dust emission. At present, dust emissions are considered in designing and installing production equipment. It is possible that with the modern machine designs now available, incorporating higher production rates, labor savings, and improved product quality, control costs to meet a recommended exposure limit of 0.2 mg/m^3 as measured by the vertical elutriator will be lower than previously estimated.

The textile production process is very complex, involving a number of distinct manufacturing steps. We have chosen for the purpose of illustration the dustiest of these operations, that of the opening of the incoming new cotton fibers at the yarn mill and the carding of this cotton. It is possible, however, that an analysis similar to that presented here will also be applicable to other production steps such as weaving.

The Opening and Carding Process

As it arrives at the yarn mill, raw cotton is a tangled mass of fibers, tufts of fibers and pieces of leaf, motes, dirt and sand. To be produced into yarn much of this trash must be removed and the fibers aligned as a roughly parallel bundle of fibers known as the sliver. The opening and carding operations convert the raw cotton into a continuous sliver for further processing (6).

Cotton bales are opened and can be either manually or automatically fed through a blender to the opener. In the openers the raw cotton is subjected to various types of beaters and/or saw cleaners to loosen tufts of cotton and allow heavier dust and dirt to fall out. The opened cotton then is transported to a picker where further opening takes place. The processed cotton is mixed up in this operation and more of the trash and short fibers in the cotton are removed. The picker forms a uniform lap which can then be fed to the carding machine. With high speed cards the picker is eliminated and the opened and blended fibers are fed as small tufts of fibers directly to the card feed via a chute.

As mentioned earlier, the cards align the fibers by opening and straightening out the tufted cotton fibers delivered to it. This process, which if fairly vigorous, not only can release dust contained in the cotton tufts, but also may crush trash particles to produce smaller particles. The cotton card is the main dust producer in a cotton textile mill.

The first mechanical card was built in 1748 and was improved by Arkwright, Smith and others until a machine in the mid-nineteenth century evolved which looked very similar to ones manufactured up into the 1960's (7). Production rates of cards also remained relatively unchanged for almost 100 years until the introduction of the so-called "high-speed card" in the 1960's (7). With the high-speed card the loading on the cylinder is reduced and the transfer ratio of the fibers from the cylinder to the doffer is increased. As this transfer ratio improved, the fibers spend less time on the cylinder, reducing the possibility of neps. Decreasing the loading improved the carding action and hence quality (8). There has been fairly rapid conversion to these high-speed cards within the textile industry when the savings in money and labor was recognized. In 1975 the ATMI

could report that 80 percent of the total weight of cotton carded in the United States was carded on high-speed cards (9).

High-speed cards have not evolved in one single step, however. It has been a continuous process where production rates attainable today were not possible as few as two years ago. In fact, many of the cards considered to be "high-speed" by the ATMI in their 1975 survey would be definitely "low-speed" today. In 1966 high-speed or high production carding was considered to mean carding at rates of 20 to 40 pounds per hour (lb/hr) (8) compared to the then conventional rates of 6 to 12 lb/hr (10).* The industry actually could be considered to now be on the second generation of high-speed cards, with current commercially available units capable of production rates of 80 to 120 lb/hr (11). This is contrasted to 1973 when most cards operated at speed of 40 lb/hr or less (12).

Dust Control

Dust and fly generated in the production stages from feeding the bales through carding consists of both relatively large material of no importance from a health standpoint, but being valuable as a waste material, and relatively small particles which have no economic value but appear to be the causative agent of bysinnosis. Local exhaust ventilation is used to handle both types of dust.

Exhaust ventilation, as used for dust control, relies on providing a sufficiently high flow of air past a particle so that it abandons its state of rest for one of motion. The air then acts as a conveying fluid to transport the

---

* Douglas Bowen writing in *Textile World* (December, 1976) states, in discussing rebuilt cards, "These cards usually run at relatively low speeds for today: 15 to 20 pounds per hour (6.75 to 9.0 kg/hr). As one small company's boss carder put it recently (with over 100 cards processing at 15 pounds per hour) (6.75 kg/hr), 'I'm happy.' "

particle to its final destination. The force necessary to encourage or control the motion of particles is that of the air currents and not the imaginary but often quoted "sucking power" of the fan. Thus the quantity of air required for ventilation would not be expected to depend on the concentration of dust in the air being removed, but rather on the dynamic properties of these particles in air.

How does this apply to high speed carding? First, although high speed carding often requires automated feeding, the amount of enclosure needed for the opening operations remains nearby the same for good dust control, whether work is carried out manually or automatically. Thus the ventilation requirements should be about the same for any raw cotton handling rate. The same should also be true for high speed carding. As machine speed goes up, particle throw will increase so that higher capture velocities (and air flow) will be required, but air volume requirements should not rise in direct proportion to the increase in speed.

Surveys of production rates and air flow requirements for several cotton mills that have undergone card modification as a means of achieving lower dust levels (13) confirm that the amount of ventilation required for equivalent dust control between old and new production processes remains essentially constant while the production rate (pounds of cotton processed per machine per hour) rises with new and rebuilt machinery. For these mills the range of air flows required per card varied from 800 cubic feet per minute (cfm) to 820 cfm while production rates varied from 18 lbs/hr. to 70 lbs/hr. Thus it appears possible that replacement of older, slower cards by higher-speed units will increase production without additional air volume requirements, or conversely, the same production rate can be maintained with significantly smaller air flows needed. This means

a rather large saving in total volume required to achieve the same total production rate. This is summarized in Table I and graphically illustrated in Figure 1, where it is seen that air volume requirements per pound of cotton decrease as the production rate increases.

We recognize that it is not always possible to use high-speed cards for all grades of cotton. For example, high quality long staple cotton fibers can be broken, with a reduction in cotton quality, if cardes with high-speed cards. This high quality cotton, however, is the cleanest raw cotton available, and so presents the least dust problem. Serious dust exposures are more likely to occur when processing low grade cotton, which can be processed with high-speed cards.

Much of the ventilation equipment on cards currently in use in the United States has been added after the machine was originally manufactured. These so-called exposed machines (14) presented great challenges to ventilation equipment designers to reduce ambient dust levels at a reasonable cost. It was recently pointed out that

TABLE I. VENTILATION REQUIREMENTS FOR CARDS AT SEVERAL PRODUCTION RATES

Mill Code	Airflow Per Card (cfm)	Processing Rate (lb/hr)	cfm per lb/hr
14	800	24	33.3
13	820	18	45.6
	820	35	23.4
8	1757	40	43.9
19	800	65	12.3
34	800	70	11.4
36	800	44	18.2

Although the majority of production cards existing in the textile industry today are low production "exposed" machines, recent technology has introduced

> higher speed production equipment which, by necessity, is more enclosed and hence more adaptable to ventilation control systems. These represent a very low number of cards in the industry, however. (14)

Economic Considerations

Under the pressure of rapid technological change, rapidly increasing labor costs and a shrinking labor supply, the textile industry has been shifting from a labor intensive to a capital intensive industry. (9).

Although the stimulus for making changes in production equipment is likely to continue to be changes in, or enforcement of, standards of exposure to cotton dust, there are other economic benefits that can accrue to the mill from the purchase new, state-of-the-art, production equipment. Much of the production machinery now in use is quite old and was originally designed with little consideration for dust emission. By going to newer equipment with controls, there is a likelihood that some or all of the costs of control could be recovered. This would be impossible with controls just added to present production capacity.

Increased Throughput

Because of the increased production capability of rebuilt, and newer second generation high-speed cards and open end spinning machinery, even with added controls it is possible to obtain a return of the capital investment. With these advantages, it becomes possible to recover the costs of attaching air filtering systems to production equipment.

> . . . in opening and carding, mills have been able to gain some production advantages in most cases while cleaning up the air. In going to high-speed carding with air-return systems, they have gained production while reducing costs. (15).

> During 1975, the automation of card rooms at two of the Company's yarn manufacturing plants was completed. This streamlining included automatic opening and chute fed cards, resulting in virtually dust-free working conditions. (15).

Lessened Operating Costs

In an analysis of a hypothetical greige fabric plant, the Kurt Salmon Associates study (16) reported the comparison of costs, using 1975 as a base year, of the then latest technology and conventional (1967) technology. Operating costs for the mill with newer cards and spinning were estimated to cost almost half of what it would cost to run a mill based on 1967 technology because of several factors, including the elimination of picking (by using high-speed cards) and roving (by using open end spinning), and the reduced maintenance requirements of both rebuilt and new cards. Even when air controls are added, the operating cost picture is still favorable. High-speed cards are able to be controlled with approximately the same air volume as conventional (low-speed cards), as noted in Figure 1. Thus, for a given amount of cotton processed, less energy is required to control the newer, faster machines compared to old cards of equivalent production capacity.

Claims of reduced operating expenditures come from several additional sources:

> It is reported that with the cost reductions and quality due to blending, the complete Bale-O-Matic System can show a 25%-30% return on investment (15).

> Some of the advantages [of automatic, chute fed cards] are:
>
> - Improved consistency of product quality, due to eliminating much of the reliance on human judgment and performance.

- Elimination of the picker and cost of the operation.
- Savings in floor space (26 to 38% for full automation).
- Elimination of lap transportation and storage.
- Reduction of labor requirements (25 to 50% for full automation).
- Better handling of "problem fibers."
- Elimination of lap waste at card feed.
- Reduction of card sliver breaks due to faulty lap joints.
- Longer life of card clothing because stock feeds fully opened.
- Elimination of double laps that produce irregular tufts at lickerin.
- Less curliness, fewer neps caused (18).

The higher cylinder speed in newer cards results in better separation of seed particles from the fibers and better overall quality. For example, with the Crosrol-Varga unit for high-speed carding an increase in the carding speed produces decreased waste with an increase in yarn quality (19).

Industry Examples

It is possible to examine the experience of several textile mills with respect to our arguments. These data were collected either through published information, review of public documents available in either North Carolina or South Carolina, or through private discussion.

Table II shows the amount of money spent by several mills in converting cards from either standard cards or first generation high-speed units, to second generation high-speed units. In all cases cited, one of the main rea-

sons for this conversion was to reduce dust levels, and in several instances the conversion was cited to indicate compliance with OSHA regulations.

Let us examine a specific example in more detail (17). Mill 5 contained 139 cards with speeds of 10 or 20 pounds per hour. This mill was faced with extensive dust control requirements. Three alternatives were examined. These were: 1) add more dust capturing equipment. This was estimated to cost about $2.8 million. At an assumed air flow of 800 cfm per card, this would represent air requirements of 40 cfm per pound of cotton per hour. 2) Use rebuilt cards with speeds of 60 lb/hr. Air flow requirements for these units are estimated to be about 1500 cfm per card (25 cfm per lb of cotton processed per hour). Capital costs would also be about $2.8 million but operating costs would probably be lower. 3) Replace the 139 cards with 32 new cards having speeds of 100 lb/hr. Assuming again the high air flow requirements of 1500 cfm per card, this would be equivalent to 15 cfm per pound of cotton processed. The estimated cost for this installation, including the addition of chute feeding, was also $2.8 million. Operational costs for this case were considered to be the least expensive of the three.

The choice was obvious. Although with all options, the capital investment did not decrease, Option 3, that with the lowest operating costs, also resulted in an increase in total carding capacity, from 2780 lb/hr. to 3200 lb/hr. In this instance, the capital expenditure for dust control resulted in increased productive capacity.

Ability to Meet Proposed Standards

There is little information available which compares dust levels to be expected with high-speed cards and appropriate dust control devices as opposed to dust levels found with conventional or first generation units. It is

difficult to compare data from one mill to another; and the installation of high-speed cards so alters the machine configuration in a card room that even before-and-after data from the same mill must be interpreted carefully.

TABLE II. NUMBER OF HIGH-SPEED CARDS REPLACING CONVENTIONAL CARDS IN MILLS SAMPLED.

Mill Code	Conventional Cards	High-Speed Cards	Was Dust Level Reduction a Primary Consideration in the Replacement Decision?	Cost of Replacement
1(A)	911	282	YES	$17,475,390[a,b]
(B)	417	82	YES	
(C)	1061	290	YES	
2	88	36	*	$923,870
3	54	12	YES	*
4	67	24	YES	*
5	139	32	YES	$2,800,000[a]
6	129	42	YES	$925,484
7	36	26	YES	*
8	108	21	YES	*
9	16	*	YES	$300,000
10	50	*	YES	$670,000

* Data not provided

a Includes air conditioning and other costs in addition to production and dust handling equipment.

b Total for A, B and C

Also, dust levels measured in one area may be the result of operations in another unrelated area.

Some limited data are available which indicate that use of high-speed cards with good dust control design can bring dust levels very close to the proposed standards.

The NIOSH Publication on Cotton Dust Control (13) describes a mill having 18 cards, each with a speed of 70 lb/hr. For dust control 800 cfm per card was used with a total of 18,000 cfm required for opening and cleaning. The total flow required, including an additional 800 cfm per card for the chute feed, is 37.1 cfm per pound of cotton processed. Designers of dust handling equipment for this mill anticipated a difficult control problem due to the high speed of the cards and the low grade of the stock being processed. This system was specified to clean up the visible lint and dust only. Surprisingly, the average dust levels (as measured by the vertical elutriator) in the card room were 0.34 mg/m^3 and in the opening room 0.30 mg/^{3}.

These levels are quite low considering that the air cleaning system was not designed for the fine particle removal. Dust capture appears to be adequate, and it would be expected that improved cleaning would reduce the average dust levels even lower.

Conclusion

Based on our examination of data already in print and interviews with control agency representatives, textile machinery manufacturers, and textile manufacturers, we summarize our finding as follows:

- Replacement of older, slower cards by high-speed units will incease production without substantial additional air requirements, or for the original production level, will reduce air requirements.

- For the same amount of money spent on controls for existing cards, additional capacity in newer, high-speed cards, also controlled, can be purchased.
- Significant operating cost reductions, coupled with increases in productivity as a result of using state-of-the-art technology, may result in a rapid payoff of equipment costs.
- Available information suggests that currently available technology can affect control of the workplace to meet the proposed new limit of 0.2 mg/m^3 elutriated cotton dust. There will be considerable waste in resources and effort if halfway measures are adopted instead of utilizing this best technology (automatic opening, second generation high-speed carding) in attempting to meet standards for acceptable dust levels.

EXHIBIT 80a

Statement of William A. Burgess

* * * * *

The feasibility of the proposed respirator use for protection against cotton dust depends principally on our knowledge of the protection one can expect from these devices and the extent to which they will be used by the workers. Let us first consider the matter of protection. The worker does not know how well the respirator is working unless he is a reactor and the wearing of the respirator reduces his pulmonary distress. The employer who purchases an approved respirator does not know the protection it affords the worker. The employer is provided technical information on respirators by the respirator manufacturers' sales representative. Does the sales representative know the level of protection afforded by the respirator? The representative is acquainted with the approval tests the respirator has passed, special studies his firm may have conducted, and certain respirator application guidelines, however, he does not know the protection afforded by the respirator against cotton dust in a given plant. It appears that no one knows the actual protection afforded by the respirator worn by the textile worker.

Some insight on the protection afforded by a respirator is available from respirator selection guides. These selection guides have been developed principally from work conducted by Hyatt at Los Alamos Scientific Laboratory (1). They are the basis for the Respirator Decision Logic of the Standards Completion Project and Table I (p. 56516) in this standard. The guides utilize protection factors as one criterion for respirator selection. Protection factor is defined as the ratio of the contaminant concentration outside the mask to that inside the mask. The protection factors were derived from tests conducted in a laboratory setting which met all require-

ments of the respirator program described in 1910.134. Do these tests reflect normal industry practice? Unfortunately, at this point in time they do not since few comprehensive industrial respirator programs meet all requirements of 1910.134. This statement can be supported by reviewing a series of in-plant studies on the effectiveness of respirators.

In an early study Caldwell and Schnell (2) evaluated the protection afforded by workers wearing oral-nasal masks in a uranium dioxide exposure. The authors concluded that "Air-purifying half face respirators are supposed to provide better than a factor of 10 protection. The computed average for the data shown is 2.1". This alarming report received little attention and has not been published in the open literature.

In a NIOSH sponsored study of respirator use in abrasive blasting (3), Blair has shown the large variability in protection encountered in the use of air supplied respirators. These devices are normally considered to provide excellent protection with a protection factor of 2,000.

> "Where air supplied helmets were used, protection factors from 1.9 to 3750 were noted. The remarkable range of these latter figures is attributable to the condition of the individual equipment rather than to any particular brand superiority."

Additional evidence of the limited effectiveness of air supplied hoods used in sand blasting has been provided by Samini et. al. (4).

A study of the paint spray industry (5) revealed that conventional air-purifying paint spray respirators provided an average protection factor of 3 for vapors and not the 10 one might anticipate from the protection factor tables. In the case of air supplied oral-nasal masks.

the observed protection factors ranged from 3 to 30, and not the 1000 cited in the guidelines.

In a study of dust respirator performance conducted by Eastern Associated Coal Co. in cooperation with the Harvard School of Public Health under a NIOSH contract the same pattern was revealed with lower protection obtained than predicted by application guides (6). A recent study of the in-plant respirator protection factors for protection against sulfur dioxide in copper smelters (7) shows that the protection afforded by three different oral-nasal masks was quite variable with mean protection factors of 22, 18, and 13. Although the mean values exceeded the guidelines protection factor of 10, the best mask had 30.4% of its tests with factors less than 10, and the worst had 56% with factors less than 10.

The protection factors proposed by Hyatt and used in Table I presume that a comprehensive respirator program is in place. This fact is stressed by Pritchard in his discussion of the application of respirator application factors (8). The studies I cited above represent what is happening in a variety of industries and what will happen in the cotton industry based on the provisions of the standard and its reliance on the general description of a respirator program in 1910.134. The proposed standard should be revised to provide specific requirements for a respirator program for the cotton industry including a requirement that the employer demonstrate the protection provided by respirators as worn in the plant.

The second issue identified in my initial remarks was the acceptance of dust respirators by the worker. With some reservation the standard accepts that respirators will provide significant protection and workers will be able to wear them routinely for protection against cotton dust. The best brief statement on this matter is that

made by A.J. Breslin an experienced industrial hygienist (9)

> "Industrial hygienists have long recognized the difficulties attendant on enforcing the wearing of respirators for long periods. Respirators are uncomfortable, impose resistance to inhalation, obstruct vision, and are somewhat encumbering. Because of these factors, workers are reluctant to wear respirators, and if the required periods of use are overlong, they may remove the respirators when not under direct supervision or wear the respirator loosely so that no protection is afforded. Time periods for which respirator use is tolerable vary with temperature, humidity, work effort and nature of the aerosol, but, in general, periods in excess of 1 hour are extreme, and it is preferable to hold times of use to 20 minutes or less. As a general rule, the use of respirators should be held to the minimum and carefully regulated."

In his testimony at the SCP hearing on the ketones, Held also stated that respirators could not be worn continuously "On many jobs, I recommended or required 15 minute coffee breaks every one to two hours while wearing a respirator rather than the usual mid-morning and mid-afternoon ones only" (10).

A foreign author has cited a case where workers with silicosis refused to wear respirators due to the inconvenience and loss of production (11). I have personally encountered this same situation in the asbestos insulation trades in the United States. My own rule of thumb is that an oral nasal mask cannot be worn continuously by a healthy worker for more than a one hour period without discomfort.

The reasons for poor acceptance of respirators has been detailed elsewhere but I do wish to consider one

factor determining respirator acceptance, namely breathing resistance. It has a special importance in this work population. The absolute values of inhalation and exhalation resistance and the ratio of the two values has a serious impact on acceptance of the respirator by healthy workers and even greater impact on those with pulmonary disability. The present U.S. standards for breathing resistance cited in CFR Part 11 in 1977 derive from arbitrary decisions made in the 1930's based on manufacturers' ability to meet a given specification rather than as a result of any physiological study (12). The limited number of studies of acceptable breathing resistance conducted since then have been, with one or two exceptions, conducted on young fit persons. The studies did not consider the response of the older worker with diminished pulmonary function. The absolute values of breathing resistance to acceptance are important and yet if you compare our standards with those of Britain, Italy and Germany you will find that ours are the highest. Low breathing resistance alone, however, is not the total answer. Silverman has shown that the ratio of exhalation to inhalation resistance is an important element in respirator design (13). He proposed that the exhalation resistance should be less than inhalation resistance unless both values are low. In valveless, single use respirators the inhalation and exhalation resistances are approximately the same. The impact of this design feature on acceptance has not been identified.

Breathing resistance was an important consideration in the specification of powered air-purifying respirators in the standard. I have designed a number of powered air-purifying respirators and I believe I have a balanced view of their application realm. The powered air-purifying respirator (PAPR) will, in the future, take a prominent position in respiratory protection but it will be on selected applications. The main contribution of

the PAPR is reduced leakage when used with oral-nasal, full facepiece and hood or helmet. If air delivery is adequate and the unit is equipped with an efficient air-purifying element these devices will provide protection factors equal to continuous flow air line equipment. One additional positive feature is the virtual elimination of inhalation resistance. Although inhalation resistance is negligible, the exhalation resistance of these devices used with facepieces is a function of the blocked tight static pressure of the blower and the resistance to airflow of the exhalation valve. It is therefore possible to have negligible inspiratory resistance and high expiratory resistance. This is counter to the recommendations of Silverman and its effect on persons with respiratory disability has not been evaluated.

The standard provides that a PAPR may be requested by the worker and this may also be a suitable substitute for transfer to a non-dusty job. In my opinion it is wrong to use the PAPR as an "escape hatch". To date there has not been a study of the use of PAPR in cotton plants, the positive exhalation resistance of the PAPR may be offensive to the disabled worker, the penalty of size and weight must be evaluated by the workers, and the present wording would permit an exposed population in excess of 300,000 persons to request a PAPR. At an estimated cost of $400.00 per unit and an annual maintenance cost of 100.00 this would represent an annual cost of 150 million dollars for these devices. This investment might be more positively applied to engineering controls.

For the above reasons I question the proposed application of PAPR in the standard. The availability of a PAPR may be a suitable substitute for transfer to a non-dusty job for certain workers but it will not be for all persons. I recommend that the workers be allowed an option—either transfer to a non-dusty job or

the use of a PAPR. My own personal view is that if the individual does have a respiratory disability a transfer is, in most cases, the better solution especially if one acknowledges the variability in protection afforded by all respirators including the PAPR.

* * * * *

EXHIBIT 82

Statement of Eric Frumin

* * * * *

II. *Respiratory Protection* (Section f)

The proposed standard would require the wearing of respirators by most exposed workers for at least seven years. The imposition of this requirement would be in violation of the Secretary's mandate under the Act to assure "the attainment of the highest degree of health and safety protection for the employee." Respirators cannot be considered to be a primary solution over a period as long as seven years.

In addition, there are several aspects of the respirator requirement which render it infeasible as a basis for a health standard:

A. Individual problems with respirator use

B. Worker resistance

C. Administrative problems in a Respiratory Protection Program (1910.134)

These will be discussed separately, followed by our recommendations concerning respirators.

A. *Individual Problems with Respirator Use*

In order to assure a proper fit workers must wear respirators which are tight to the point of discomfort. While some respirators are less troublesome than others, none can be considered as positively comfortable. The discomfort is often aggravated by the conditions of high heat and humidity which are often present in textile mills. The feelings of discomfort can also be aggravated if a worker has a common cold or other breathing or sinus interference unrelated to occupational exposures. The presence of dermatitis or other skin conditions may be exacerbated by the wearing of a respirator, and

workers often describe the irritating effect that respirators have on normal skin.

In addition to physical discomfort, workers subject to a respirator requirement undergo psychological discomfort which is at least as serious. Those who already suffer from claustrophobia certainly cannot wear a respirator comfortably. The wearing of respirators is objectionable to workers because of its disfigurement of their personal appearance. Moreover, it may require the alteration of one's preferred appearance (e.g., shaving of beards, etc.) Finally, respirators also interfere in one's ability to communicate. This is no small problem in an industry whose workers are already afflicted with the greatest noise hazards of any major industry. The further and unncessary deprivation of social contact on the job would represent a complete abandonment of the workers' right to be a liveable workplace.

Another major problem is poor fit. No single respirator can fit all individuals, yet it is a rare employer who can be relied upon to offer an adequate supply of different types of respirators to all affected employees. Those employers who do offer more than one type are generally unable to do the proper supervision to insure that the chosen respirator is appropriate to the individual's need.

Some problems with fit are simply beyond the control of an employer or his workers. Workers who wear glasses or dentures or have unusual facial structure may be unable to wear respirators under the best of circumstances.

If a properly tight fit is achieved, a non-powered respirator must of necessity interfere with the worker's ability to breathe. Additional proof is not necessary to demonstrate that significant numbers of the workers who will be required to wear respirators have already suffered some loss of lung function. Even the single-use, disposable respirator offers significant (though lessened) intereference. OSHA has recognized the seriousness of this problem by providing for the optional use of a

powered respirator. The technical impracticality of this "solution" will be discussed by Dr. Burgess. Suffice it to say that the final promulgation of this requirement would inflict cruel and unusual punishment upon those whose suffering was supposed to be eliminated by the passage of this law. Moreover, regardless of the regulatory options, the wearing of any respirator constitutes a hazard to the health of workers with decreased lung function, and must be avoided if at all possible.

B. *Workers Resistance to Respirators*

In view of the problems cited above, it is unlikely that workers will accept the wearing of respirators in large numbers. Worker resistance to respirator requirements is well known throughout industry, and will be the subject of additional testimony by ACTWU witnesses. Several aspects of this problem are worthy of detailed consideration.

One major reason workers will not wear respirators is because of the unfairness of placing the onus of such a sacrifice on them in order to achieve workplace health and safety. In the absence of an extensive employer commitment to hazard abatement, workers cannot appreciate the seriousness of the hazard. Training and education programs may attempt to fill the gap, but as the saying goes, "Talk is cheap." Unless workers see that all parties are seriously concerned with preventing byssinosis, they will not accept a disproportionate burden for themselves.

Also, wearing of a respirator may interfere with a worker's ability to work at normal speed. Without a mechanism for preventing any earnings loss for those who work on piece-rated jobs, workers often feel compelled to protect their earnings rather than encumber themselves with respirators.

Finally, the need for respirators is not always evident to the workers in a cotton-dust area. The initial symptoms may not be directly connected in the worker's mind to the actual dust hazard. The temporary nature of the initial symptoms leads workers to believe that there is little threat of chronic disabling disease.

C. *Administrative problems in a Respiratory Protection Program (according to OSHA regulation 1910.134)*

The proper administration of a respiratory protection program is a complex task, and requires a sophistication and dedication concerning worker health which are generally lacking in the textile industry. The character of hygiene programs in the industry will be described in more detail by the witnesses who will follow.

Among the more serious obstacles to proper administration of a respiratory protection program is the need for comprehensive training of supervisors in the use and maintenance of respirators. Time taken for such training as well as the actions suggested by such training are in direct contradiction to the supervisors' first concern—increased production. Furthermore, the supervisors' prevailing preference to enforce rules rather than to educate workers on the need for compliance make them less than receptive to the content of an appropriate training program. Finally, the extended period of time required for the administration of the program places great strains on whatever inclination a supervisor might feel to educate rather than enforce.

Another difficulty in administering a respiratory protection program is the necessity of educating workers in the need for the program and in the proper use of the equipment. In view of their normal resistance to the wearing of respirators, workers require an extended, thorough and repeated training program in order to

motivate them to comply with the program's rules. Such training can only be done during working hours, which creates anxiety about loss of earnings opportunities among workers on piece-rate jobs. Unless the quality of the training program is consistently maintained, workers will not feel a serious motivation to wear the respirator, and an enforcement mechanism will then become necessary. Once enforcement becomes the prime technique that the employer uses to assure compliance with the regulation, the Respiratory Protection Program is likely to fail. As stated by NIOSH in its *Guide to Industrial Respiratory Protection*, "Just throwing a respirator at a worker with orders that he wear it because OSHA says so is one of the easiest ways to ensure its misuse." (1)

Other obstacles to proper program administration are the requirements for adequate maintenance and storage. Most employers in the textile industry have little experience with such requirements despite the existence of regulations for the past six years. Furthermore, many manufacturing facilities are isolated and lacking sufficient numbers of workers to justify the hiring of a trained, competent safety director or industrial hygienist. Generally, respirator maintenance is left to management in a personnel office whose primary interest is assuring an adequate supply of labor for production purposes rather than providing workers opportunities to take time off for maintaining their respirators.

D. *The Proposed Requirements for Respiratory Protection Is Not Feasible*

The requirement for respiratory protection in the proposed standard is not feasible when applied to all workers exposed to excessive cotton dust over a seven year period. We have described the practical problems with individual fit and comfort and inherent limitations on workers' willingness to cooperate. Also, there are dif-

ficulties in the proper administration of a respiratory protection program even when the employer is making a good-faith effort.

These difficulties have been aptly summarized by C. M. Anglin, a NIOSH engineer, as follows:

> "The experience of the (Public Health Service) has been that respirators are sufficiently unreliable and unacceptable to workers to warrant the recommendation that they should be employed only as a last resort after all other feasible methods of hazard reduction have been tried. The unreliability of respirators can be due to poor face fit, inadequate maintenance and other factors that reduce the capacity of the respirators to filter the dust from the inhaled air. Worker rejection of face mask respirators that are supposed to be worn during the entire work shift is high and is one of the major failings of any respirator program. If the worker does not wear the respirator properly, he certainly will not be protected. Workers with impaired breathing function due to byssinosis or any other respiratory disease present a problem when wearing respirators due to the increased breathing resistance caused by the respirator filter. In some cases, this increased resistance is simply too great a task for the already impaired worker to endure.
>
> "It appears that respirators are not suitable for protection of textile mill workers in most instances." (2)

In the textile industry we have reason to doubt that the necessary good-faith effort by management will be forthcoming. While we cannot predict the future, the experience in the past does provide some guidance in this area. We have reviewed the files of all cotton dust inspections conducted by North Carolina OSHA in the

period 1975-1976. This survey reveals that in 100 opening, picking and carding departments visited by OSHA inspectors, only 15 were in compliance with permissible exposure limits for cotton dust. In those 85 not in compliance, the inspectors found that in 75 departments the respiratory protection programs were either non-existent or not in compliance with regulation 1910.134. Based on this experience, we feel it is unreasonable to expect that a respirator requirement is a feasible method of protecting worker health for the next seven years. The only solution to this problem is to reduce dust levels, as soon as possible, in order to eliminate the need for the wearing of respirators. Such a policy places the burden upon the employer, where it belongs.

E. *Recommendations concerning the Requirement for Respiratory Protection*

We have several recommendations concerning the final standard's provision for respiratory protection. First, we urge that the employer be required to consult with the employees or their authorized representative in the development of a written program. This is the most effective way to ensure that worker resistance to the rules for wearing respirators is minimized. Lacking such consultation, the employer is likely to establish a program in which the workers play a passive role, thus generating resentment tending to negate the effectiveness of the program. In particular, the employers must not be allowed to choose any particular respirators nor to develop any policies for management of resistant workers without allowing the workers a voice in those deicisions.

Furthermore, we urge the adoption of approved single-use, disposable respirators as an appropriate respirator for dust concentrations up to 2000 ug/m^3. These respirators have been recommended by NIOSH in the *Criteria Document.* Attached is a letter from the Chief of the

NIOSH Testing and Certification Branch reiterating that recommendation. From the workers' viewpoint, single-use respirators are preferable because of the lessened discomfort and resistance to breathing. This point was also noted in the Criteria Document. (3)

Finally, our recommendations for medical surveillance described below, will insure that a comprehensive program is undertaken to protect the workers' health, including the transfer of those workers unable to wear respirators. Such a program is essential to preclude the use of respirators as a long-term solution.

In view of the general preference for single-use, disposable respirators, we urge that employers be required to offer both the single-use, disposable respirator as well as at least one other air-purifying respirator suitable for concentrations below 2000 ug/m^3.

* * * * *

The fact is that there is a significant conflict of interest for any physician who diagnoses byssinosis in an active worker. If he makes the diagnosis, the employer is subject to claims for Worker Compensation. In view of the widespread prevalence of this disease, such claims cannot be considered financially immaterial. On the other hand, the diagnosis is obscured or denied, then the patient's health is placed at further risk. It is entirely inappropriate to the purposes of the Act to allow such a conflict to arise at all.

Furthermore, * * * the records of examination results often become the property of personnel offices. This transfer of records leaves the worker at risk of discriminatory treatment, including termination. Since most workers lack other means to protect themselves against such treatment, it is unreasonable—based on the record of this industry's performance thus far—to subject them to a continuation of these policies. The inevitable result will be the boycotting of the examinations by a large

number of workers, thus defeating the purposes of this provision. If it is the Secretary's intention that such examinations be made as widespread as possible, then it is his responsibility to protect the workers against the potentiality for abuse.

* * * * *

B. *Management of Byssinosis Victims*

A glaring deficiency in the proposed standard is the lack of definite guidelines for management of workers identified as suffering adverse effects from exposure to cotton dust. The standard calls for the Examining Physician to give a written opinion, including "any recommended limitations upon the employee's exposure to cotton dust or upon the use of equipment such as respirators." Further, the standard requires that a worker who cannot wear a conventional respirator be offered a powered, air-purifying respirator.

The latter proposal is an ill-advised attempt to avoid the questions raised by the omission of management guidelines. It is the omission itself which most seriously threatens the workers' health, and runs contrary to every principle of preventive medicine. Workers who are at risk of further damage must be given the right to transfer to a job in a less-dusty or non-dusty operation, without any loss in earnings or benefits, either present or future. To deny workers this right is to force them to choose between the slow, insidious development of byssinosis or the quick death of starvation. The choice will be obvious, and the purposes of the Act and this standard will have been defeated. This right has been advocated by the Occupational Hazards Task Group of the National Heart, Lung and Blood Institute (NHLBI): "Job transfer without economic penalty should be possible if necessary to protect the health of individual workers."

* * * * *

EXHIBIT 92C

Statement of U.S. Department of Agriculture

* * * * *

Our review of OSHA's inflationary impact statement reveals a very thorough and detailed analysis of the impact of the proposed cotton dust standards on the American cotton industry. The cost estimates in particular are quite detailed and confirm our belief that they are of such a magnitude that many textile mills either would not be able to make the additional investment, which would imply a drop in cotton use, or if they did make the investment, prices of cotton textiles would rise sharply. Either way, both cotton producers and consumers lose.

In fact, we believe that the inflationary impact analysis conducted by the Research Triangle Institute substantially underestimates the price impact on cotton consumption of implementing the proposed new regulations. The erroneous use of elasticities designed only for short-run use is primarily responsible. For example, the analysis was based in part on elasticities from our study, "U.S. Textile Fiber Demand-Price Elasticities in Major End-use Markets". These elasticities are very small and are useful only in the short run, i.e., a year or less. Over the longer run, price effects are cumulative and thus the impact is much greater. As pointed out in our study,—"these observations support the hypothesis that cotton demand is inelastic in the short run, particularly when cotton prices are declining. In the long run, however, demand would be expected to be less inelastic and may even be elastic with respect to price."—This means of course that a 10 percent increase in cotton prices, for example, may result in only about a 3 percent decline in cotton consumption in the short run, but may result in well over a 10 percent decline in consumption in the long run. Consequently, based on the increased costs of implementing the proposed cotton dust standards and their impact on

cotton prices, we believe that consumption will fall much sharper than envisioned in the inflationary impact statement. Thus, the economic impact on the cotton industry will be much more severe.

In contrast to the detailed cost estimates, the inflationary impact statement does not place a value on the benefits derived from adopting the proposed standards. We believe that such a cost-benefit analysis would reveal that the costs far outweigh the benefits. This is not to say that the health of textile workers is not important. But we do question the relatively small number of employees affected in relation to the tremendous costs associated with the adoption and implementation of the proposed standards.

In summary, we urge OSHA to adopt a cotton dust standard which is both technologically and economically feasible, for we believe that the future of the American cotton textile industry is at stake. The adoption of too stringent a standard will seriously disrupt the U.S. cotton industry, thereby undermining the livelihoods of many thousands of people who depend directly or indirectly on the production, marketing, and sales of raw cotton and cotton products.

EXHIBIT 101

Statement of John S. Barr, III

* * * * *

I am quite aware of the fact that formulas can be constructed for calculating price elasticities of demand—formulas which theoretically, would enable one to compute the loss in volume that a 36¢ per pound increase in the price of cotton fabric would effect. But I also know that the limited published work on price and cross price elasticities in textile fibers has been very largely a reflection of its authors' subjective opinions and all of it relates to *short term* responses.

The real damage from a non-competitive cotton fiber or cotton product price accrues over the long term following management decisions which often involve the purchase and installation of equipment oriented toward alternate fibers. There are *no* reliable measures of *long term* price demand elasticities for cotton and other fibers.

Accordingly, the National Cotton Council will not attempt to project the absolute loss which cotton would suffer as a result of dust control costs. We do take exception to Research Triangle Institute's projection that the costs associated with the proposed dust standard would result in only a 310,000 bale total loss. The use of short term coefficients of elasticity in computing price-related losses for cotton renders their results totally invalid.

Moreover, Research Triangle Institute completely ignored the potential effect of higher costs and prices on U.S. *exports* of raw cotton. Inasmuch as 38 percent of U.S. cotton is sold abroad, we regard this as a rather significant oversight. Another curious oversight was RTI's failure to evaluate the effect of substantially higher yarn and fabric prices on the U.S. balance of cotton textile trade.

Seemingly, each of these points merit further thought for a better appreciation of the magnitude of cotton's

loss potential associated with the cost of this proposed standard.

First, the role of consumer demand: we have already noted the fallacy of using short term measures of elasticity to compute cotton's price-related loss potential and the absence of any long term coefficients. But, more and more, the morass of regulation which requires tremendous non-productive capital expenditures is preempting the consumer's influence on product availability.

Cotton's textile mill customers, for instance, are faced with a noise standard that is estimated to require billions of dollars in capital outlay, a dust standard requiring billions more, plus water and air pollution controls and flammability standards which will require an undetermined amount of capital. Where is this money coming from? Certainly not from internally generated cash flows. The annual expenditure required for the dust standard alone is nearly eight times the industry's profits from cotton textile sales. What textile mill owner or board of directors will assume these massive debt risks, on the *chance* that enough price increase can be passed on through the channel to cover costs and provide a meager return? And if such speculative principals can be found, what lending institution is willing to assume the risk.

Can there be any doubt that the textile industry would seize on every opportunity to substitute other fibers? Would they have any choice? By the time an engineered exposure limit of 0.2 mg/m^3 was required, would there be more than a token domestic market for cotton?

And, now what about the standard's potential effect on cotton's export market. We have shown that the cost of the dust standard in ginning, warehousing, merchandising and crushing would add 4 cents a pound to the price of cotton. In the last five years 38% of our cotton

marketings have gone into export channels. Since the foreign world consumes considerably more cotton than it produces, foreigners look to the U.S. for the remainder of their needs and the U.S. has been the world's leading cotton exporter. The price at which we export our cotton is the focal point for prices of foreign growths, making us the price leader for the cotton world.

Dust control costs will have to be reflected in U.S. cotton prices and these prices will in turn, result in higher cotton prices around the world. What effect will this have on U.S. cotton exports?

U.S. cotton's competition in the export market comes from two broad sectors—foreign cotton and man-made fibers. The higher prices resulting from the dust standard in the U.S. means a higher profit margin for foreign cotton growers, since these growers have no correspondingly higher costs. This tends to draw acreage in foreign countries away from food production into cotton production and narrows the deficit between foreign consumption and foreign production of cotton. This, in turn means smaller U.S. cotton exports, smaller foreign exchange earnings for our nation to help pay for foreign oil and other import requirements, and smaller markets for U.S. cotton growers. To put this into perspective, it might be helpful to observe that a 10% increase in foreign cotton production is equivalent to *all* of U.S. production for the export market.

Higher cotton prices worldwide also make cotton less competitive with man-made fibers and cause market losses to these fibers. This, too, narrows the gap between foreign cotton consumption and production, reducing U.S. exports even more.

Only when the U.S. is forced essentially out of the cotton export market will foreign cotton prices break away from U.S. prices and find a separate equilibrium.

OSHA's proposed dust standard would also have very serious implications for the U.S. trade balance in cotton textiles and textile products. In 1975 the U.S. trade deficit in cotton textiles approximated 300,000 bales. In 1976 the deficit widened to more than 600,000 bales, largely the result of a price disadvantage for U.S. cotton textiles. Imported cotton textiles accounted for 20 percent of domestic cotton consumption in 1976.

We find RTI's conclusion that the proposed standard would have no effect on foreign trade in cotton textiles difficult to reconcile with their observation that "large changes in the relative prices of domestic and foreign textile and apparel products do have an impact upon the domestic textile industry." RTI's study indicated that cotton fabric and yarn prices would have to increase nearly 18 percent to pay for the standard. Undoubtedly, they view this change as too small to make any difference in the ability of U.S. cotton textiles to compete in world markets. Yet, they observe that "international monetary changes since August 1971 have had a significant effect upon foreign trade of U.S. textile products." RTI failed to note that these monetary changes were equivalent to a 7.5 to 8.5 percent change in the price of U.S. cotton textiles—less than half the price increase which they estimate would be required to pay for the dust standard.

If U.S. cotton textiles are forced to take on a further 36¢ pound disadvantage, we will be hard pressed, indeed, to sell our cotton fabrics abroad and we might well be at the mercy of U.S. trade negotiators to retain, through quota arrangements, some portion of the domestic market for U.S. mills.

With respect to the proposed standard's cost, I want to underline what others have said about the interdependence of all sectors of the cotton industry. If OSHA's proposed dust standard is beyond the financial capability of one sector, it is beyond the capability of all, for no segment is dispensable. * * *

* * * * *

EXHIBIT 111

Comments of the Council on Wage and Price Stability

* * * * *

* * * The proposed standard fails to consider the differences in health impact signaled by the different types of grades of byssinosis. And the proposed standard fails to consider the effect on byssinosis prevalence of the current standard, which has been in effect only a short time and even now has not achieved full compliance. Many of the benefits of the proposed standard might actually be achieved by the present standard if the present standard were more vigorously enforced.[1]

The Role of Cost-Effectiveness Analysis

Although the Council on Wage and Price Stability Act, the two Executive Orders, and the OMB instructions quoted above all seek to promote cost-effectiveness in governmental decisionmaking, the Occupational Health and Safety Act does not directly mention cost-effectiveness as a factor to be considered in setting standards. However, section 6(b)(5) of the Act does require the Secretary of Labor to give due regard to the question of "feasibility."[2] As OSHA has stated in the *Federal Register*, "while the precise meaning of this term is not clear from the Act or the legislative history, it has generally been construed in a standard-setting context [to] include both technological and economic considerations" (41 *FR* 46748).

It is the Council's position that the goals and intent of the two Acts are consistent. In fact, we believe they are complementary because only the proper use of cost-

---

[1] However, we are not arguing that the present standard be retained; rather the conditions used to support the current standard should not be used to again support a new standard before the impact of an enforced current standard is carefully considered.

[2] Public Law 91-596.

effectiveness analysis can "assur[e], to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life." [1] As long as OSHA places some limit to the costs an industry can bear before its existence is threatened and OSHA stops at that limit (or some earlier one), then it is a recognized scientific principle that more employees can be protected by a standard based on cost-effectiveness principles than one not based on cost-effectiveness grounds.[2]

* * * * *

The major defect of the cotton dust economic impact analysis is that cost-effectiveness analysis by stage of processing or for the individual provisions of the standard has not been performed. The brief two page analysis that was performed (in the 543 page, two volume report) provides the decision maker with little insight since it only compares three alternative dust levels for one segment of the industry. Moreover, the analysis is replete with theoretical errors and inconsistencies.[1] If the decision maker had an idea of what costs he was willing to impose upon industry for the benefits produced, this type of analysis, properly performed, would help determine what dust level should be mandated for this segment of the industry. It should also be noted that the OSHA analysis is an implicit use of cost-benefit analysis. However, the point we emphasize is that once the feasible level of cost has been determined by OSHA, the use of

---

[1] Section 6(b)(5) of OSH Act of 1970 (Public Law 91-596).

[2] For a recent careful application of cost-effectiveness analysis to the health sector see John Bunker, Benjamin Barnes and Frederick Mosteller, *Cost, Risks, and Benefits of Surgery* (New York: Oxford University Press, 1977).

[1] *Inflationary Impact Statement*, p. V-43, 44.

the methods outlined below would produce more protection for employees than the proposed OSHA procedures.

Costs of the Standard

The IIS estimates that the total annual cost of complying with the proposed 0.2 mg/m³ respirable cotton dust standard would be $694.9 million including an annualized capital charge of $433.6 million for capital costs of about $2.7 billion.[2] Estimates of annual costs of $82.5 million for a 0.5 mg/m³ respirable dust standard and $1,737.4 million for the 0.1 mg/m³ standard recommended by the Amalgamated Clothing and Textile Workers Union[1] are also presented. The Council is not able to judge the reasonableness of these estimates since it lacks the necessary technological and engineering expertise. However, we note that the estimates have been criticized as being both too high and too low. We have reviewed both sets of criticisms and find ourselves in sympathy with both.

The American Textile Manufacturers Institute criticized the IIS estimate for not including the cost of meeting the present standard and for using the old Internal Revenue Service depreciable life period for textile machinery of fourteen years to annualize capital costs while the new standard is eleven years. These modifications increase the annual cost estimate for the 0.2 mg/m³ standard to $823.7.[2] If OSHA is trying to estimate the full impact of tightening and enforcing a new standard on the financial viability of an industry it is correct to include the costs of meeting the current standard. It is

---

[2] *Inflation Impact Statement*, p. I-25.

[1] See "Statement of L. K. Fitzgerald for American Textile Manufacturers Institute, Inc. Before the OSHA Cotton Dust Hearing", this docket.

[2] *Ibid.*, p. 6. The estimate refers only to the cotton textile industry and does not include cotton waste processing.

not correct if one is estimating the incremental costs and benefits of a proposed regulation. However, the IIS estimates total, not incremental, benefits,[3] and therefore counting only incremental costs is not correct. Ideally, both total and incremental costs and benefits should be computed so that the impacts of both the present and the proposed standards can be examined.

The second criticism on the length of the depreciable asset period holds only if the depreciation period reflects the economic life of the asset. If the economic life of textile machinery has not changed, then the new shorter depreciation periods actually indicate that the textile industry will have an easier time in meeting the new standards than the IIS estimated because of the greater cash flow. Since we have no estimates as to the actual economic life of the standard-induced equipment, a range of cost estimates should be presented.

While critics who argue that the IIS cost estimates are too high present a more appealing theoretical case, they do not present alternative numerical estimates. The Amalgamated Clothing and Textile Workers Union argued that the most serious deficiency in the IIS is the assumption of no technological change in the cost calculations.[1] As Nicholas Ashford puts it: "Decision makers who do not take proper account of the process of innovation are likely to overestimate the long-run costs of preventing occupational injury and disease."[2] The role of

---

[3] For example see footnote d, table 1 below which has been reproduced from the *IIS*, table V-20, p. V-44.

[1] "Statement of the Amalgamated Clothing and Textile Workers Union, AFL-CIO" (April 5, 1977), this docket, Volume I, p. 20.

[2] Nicholas A. Ashford, *Crisis in the Workplace*, Cambridge, Mass.: the MIT Press, 1976, p. 338. The examples of vinyl chloride, asbestos, and now fluorocarbons appear to illustrate the principle that innovation reduces the *ex post* costs to compliance in comparison to the estimates.

innovation in reducing the hazards of byssinosis may be especially important for the proposed standard because of the relatively long proposed compliance period of seven years which should enhance the possibilities of innovation. Also to the extent that the final standard is a performance standard, the possibility that innovation will reduce compliance costs is increased.

Although it is impossible to estimate with much confidence the decline in the real costs of meeting the standard that technological change might produce, the ISS's assumption of no change probably overstates costs. In fact, according to a study by McGraw-Hill, the rate of labor productivity growth between 1967 and 1975 for a gray fabric textile plant was about ten percent per year.[1] It is likely that predictions of technological change based on past trends and expert opinion would provide a better estimate of the cost of compliance than do estimates based on a zero rate of technological change.

Taking into account the various biases, we believe that the IIS overstates the costs of the standards because of the strong incentive to reduce costs through technological modifications. However, we emphasize that this conclusion is extremely sensitive to the design of the final standard. We will suggest certain improvements in the proposed standard that should enhance the possibilities that innovation and technical change will substantially reduce the social costs of the standard.

Benefits

The benefits of the proposed cotton dust standard have also been estimated in the IIS; our feeling is that they too probably have been overstated. The primary benefit of the cotton dust standard would be a reduction in the prevalence of byssinosis. Byssinosis is a specific respira-

[1] *Textile World*, May 1976.

tory disease, the symptoms of which are caused by the action of some unknown agent or agents in cotton dust on the respiratory passages. The symptoms (shortness of breath and chest tightness) may be temporary or permanent depending upon the length and level of exposure and the individual. The symptoms of byssinosis have been classified by R.S.F. Schilling into reversible grades, grade ½, 1, and 2, and permanent incapacity, grade 3 as follows:

(a) Grade ½-occasional chest tightness on the first day of the work week.

(b) Grade 1-chest tightness and/or breathlessness on Mondays only.

(c) Grade 2-chest tightness and or breathlessness on Mondays and other days.

(d) Grade 3-Grade 2 symptoms accompanied by evidence of permanent incapacity from diminished effort tolerance and/or reduced ventilatory capacity.[1]

The reduction in byssinosis prevalence appears to be the only significant benefit of a cotton dust standard. Although OSHA states that other respiratory diseases such as chronic bronchitis may also be caused by cotton dust,[2] Dr. Arend Bouhuys, director of the Yale University Lung Research Center, has pointed out that the continuing discussion concerning the co-existence of chronic bronchitis and of byssinosis is one of semantics.[3] "There is little or no reason to describe cotton textile workers . . .

---

[1] 41 *Federal Register* 56580. Also note that according to the IIS, there is no evidence of excess mortality among American textile workers. (*IIS*, p. III-6)

[2] *Ibid.*, p. 56501.

[3] Letter from Arend Bouhuys M.D. to Walter Gawlak, February 22, 1977, with comments on proposed Cotton Dust Standard.

as having some separate disease entity labeled chronic bronchitis." [1]

The IIS also mentions several other possible benefits such as cleaner workrooms, reduced workmen's compensation costs, discovering other respiratory diseases from the medical surveillance program, medical records useful for scientific studies and "some small improvement in product cleanliness and quality." [2] With respect to increased cleanliness, since the proposed standard would apply to invisible dust while the current standard applies to all dust, it is possible that the shift to the control of invisible dust might actually increase visible dust and therefore have the opposite effect. In any case we doubt that the amount of visible cotton dust in workrooms has the undesirable effect on worker morale hypothesized in the IIS.

Counting a reduction in workmen's compensation premiums as a social benefit is a common mistake in this type of analysis. The reason that these costs should not be counted as additional benefits to the standard is because the reduction in payments by firms is matched by a reduction in payments received by workers.[3] In other words, workmen's compensation payments are simply transfers from one group to another while the real benefit is the decline in byssinosis prevalence.

The benefits from medical surveillance and record keeping are real but probably small. It should also be noted that they are not attributable to the engineering and administrative controls analyzed in the IIS.

---

[1] *Ibid.*

[2] *IIS*, p. III-19-20.

[3] This is true except for the cost savings of administering a smaller workmen's compensation program. However, the administrative costs that OSHA will incur in establishing and enforcing a cotton dust standard have not been counted, either.

The IIS uses estimates of byssinosis prevalence by cotton dust exposure level to calculate the number of byssinosis cases that would be prevented by the three cotton dust levels, 0.5, 0.2, and 0.1 mg/m^3 respirable, for which it also calculated cost data. The major flaw in the analysis is that incremental benefits are counted from current conditions which do not, in general, conform to the present standards. On the other hand costs were calculated from an assumed compliance with the present standard to compliance with the new standard. Thus, costs and benefits are not measured symmetrically.

A second problem with the benefit estimate is that all grades of byssinosis are lumped together in the IIS. Thus symptoms such as occasional chest tightness on Mondays are equally weighted with "permanent incapacity" and combined into one simple index. Although it is most difficult, as the IIS points out, to assign dollar values to health benefits, a system that simply sums all degrees of health problems from the serious to the inconsequential omits important information and may be misleading. Furthermore, if eliminating "material impairment" and not occasional discomfort is OSHA's main concern, then standard development should focus on the irreversible harmful health effects. As Dr. Russell Harley has testified, "Grade ½ 'byssinosis' is a nebulous entity, probably useful in epidemiologic work, but hardly acceptable as a 'disease.'" [1]

Finally, the underlying data used in the IIS to estimate benefits are subject to major criticisms and are on the high side compared to other estimates that have been made. The IIS's basic data for the benefit estimates are based on the study by James Merchant *et al.* pub-

---

[1] Statement of Russell H. Harley, M.D., before OSHA on the Cotton Dust Standard, this docket, p. 2.

lished in *Journal of Occupational Medicine.*[2] However, Dr. Moon W. Suh, a statistician for Burlington Industries, makes a strong case that there are errors of statistical design and analysis in the study that create an upward bias in the estimated dose-response relationship between cotton dust and byssinosis.[3] He has testified that the sampling procedure was not random but biased toward the worst plants, that the probit analysis used in the study was not appropriate, that geometric means and medians were used when arithmetic means would have been appropriate, that certain sample points were incorrectly dropped from the analysis, and that the data were not randomly grouped.[4]

The results of the Merchant study also appear to be high compared to other studies listed in the National Institute for Occupational Safety and Health (NIOSH) criteria document.[5] For example, NIOSH states:

> "To summarize, the prevalence of byssinosis, Grade ½ or greater, among carders has been found to be from 20-40% in the most recent British and American studies.[1]

However, the IIS uses a byssinosis prevalence estimate for carding of 50 percent (based on Merchant's data) in estimated benefit levels.[2]

---

[2] James Merchant *et al*, "Dose Response Studies in Cotton Textile Workers," *Journal of Occupational Medicine*, March 1973).

[3] "Statement of Moon W. Suh, before OSHA on the Cotton Dust Standard," this docket.

[4] *Ibid.*

[5] *Criteria for a Recommended Standard Occupational Exposure to Cotton Dust* NIOSH, 1974.

[1] *Ibid.*, p. 50. The range for the United States was 20 to 29%. (See table XII-6, p. 145, *Ibid.*)

[2] See *IIS* p. III-11.

The IIS further overestimates benefits because it assumes that the risk of byssinosis for new workers is equal to the byssinosis prevalence estimate developed by Merchant *et al* for all employees. Merchant's study estimates the current [1970-71] prevalence of byssinosis for workers who in the past have likely been exposed to higher levels of cotton dust than they are now exposed to. As Dr. Bouhuys points out, byssinosis has been recognized as an important health hazard to U.S. cotton textile workers only since 1967.[3] Additionally, cotton dust was not regulated until 1968, under the Walsh-Healy Act which applied just to government contractors, and until 1971 as one of the consensus standards under 6(a) of the OSH Act. As the IIS points out, this regulation has not as yet been fully achieved.[4] Thus, presumably over time average dust levels have been declining and will continue to decline at least until the present standard is met. Using historical byssinosis prevalence rates will thus overstate the benefits of a new standard.

* * * * *

Again it should be noted that both the benefit data and cost data examined here refer only to the impact of the dust level control program. It may be that the benefits of the medical surveillance program or the respirator program would be greater than the benefits provided by the dust control program. * * *

* * * * *

* * * These two provisions might provide more cost-effective solutions to the byssinosis problem. The cost-effectiveness of each provision should be examined independently and in concert with the other provisions in order to ensure the most protection for the least cost. This the IIS does not attempt.

---

[3] See "Statement by Arend Bouhuys," *Op. Cit.* p. 6.

[4] *IIS*, p. V-8.

An Alternative Proposal

Lack of information, both on the economic impact and the health benefits of alternative standards makes the setting of a reasonable standard an exceedingly complicated process.

In addition to the problems of estimating the costs and benefits that we have discussed, perhaps the major shortcoming of the proposed standard is that the substance to be regulated, respirable dust, is only imperfectly related to the performance we desire—improved employee health. As pointed out earlier OSHA does not know what the actual substance or substances are that cause the symptoms of byssinosis.[1] The toxicity of the regulated substance varies depending upon stage of process, type of cotton, blend of synthetics, ambient dust levels, and methods of picking and cleaning, but not directly with "respirable dust levels."

Several investigators have suggested that the standard should provide a feedback mechanism between the results of the medical surveillance program and the effectiveness of engineering controls.[2] The standard could simply specify the required results of a medical surveillance system. Such a system would be workable because the early stages of byssinosis are detectable and reversible. * * *

* * * * *

Conclusion

The Council on Wage and Price Stability has carefully examined the *Inflation Impact Statement* and the

---

[1] For example, Dr. Bouhuys believes that there might be several active agents, perhaps with different agents responsible for different grades of byssinosis. See "Statement of Dr. Bouhuys," *Op. Cit.*, p. 3.

[2] For example see *Ibid.*, p. 8 and "Statement of Amalgamatical Clothing and Textile Workers Union," Vol. II, *Op. Cit.*, p. 16.

record pertaining to costs and benefits in this hearing. We believe that the proposed standard could impose excessive costs upon the cotton processing industry unless the standard is carefully formulated to take into account cost-effectiveness considerations and the potential for including positive cost-reducing innovations.

We have criticized the IIS for not carefully taking into account the full implications of the proposed action or considering alternative regulatory approaches that have the potential to both reduce costs and increase benefits, perhaps at the cost to OSHA of a slightly more complicated and expensive enforcement effort. We urge OSHA to consider the full range of alternatives and to develop the information on costs and benefits necessary for rational and effective standards development.

* * * * *

EXHIBIT 113

Statement of Sidney M. Wolfe, M.D., and Peter Greene

* * * * *

Furthermore, studies of employed cotton workers at a frozen moment in time tend to overstate the number of "reversible," and understate the number of "chronic," brown lung cases caused by a given dust level. This is because workers retire and drop out of the study population when their "reversible" symptoms become chronic. Thus many workers who are listed as having "reversible" or low grade byssinosis in the factory studies will actually go on to develop chronic byssinosis.

A new community-based study by Bouhuys *et al.*, described by Bouhuys in his testimony here, confirms the previous underestimation of chronic byssinosis.

The point is that OSHA cannot disregard cases which are listed as "reversible" in the "one-shot" factory studies, without seriously underestimating the dose-response relationship for chronic byssinosis and setting the standard too leniently (too high).

* * * * *

EXHIBIT 124

Bouhuys, *et al.*, "Epidemiology of Chronic Lung Disease in a Cotton Mill Community"

* * * * *

Most surveys in industry have shown an excess of chronic respiratory symptoms, as well as loss of lung function, among active workers at risk[29, 34]. However, the total population of textile workers at risk of chronic disease also includes retired workers. Active workers form a group biased in favor of healthy individuals. Retired workers, in contrast, include those who left the mills because of disabling lung disease, and thus this group is biased in favor of diseased persons. We had previously identified several cases of disabling byssinosis among retired workers who lived in mill communities[9]. To describe the prevalence of chronic lung disease adequately, we therefore decided on a community-based study which would include retired as well as active workers.

We are confident that our results in members of the original cohort of carders and weavers (Table 1; Group A in Table 3) provide a reasonably accurate picture of the respiratory health of active and retired cotton textile workers who continue to live in the community surrounding the mills. Of those whom we identified and traced, 95% participated in the study. The results obtained in this cohort were similar to those in the additional group of men and women studied (Group B in Table 3). We have concluded that the total study group, too, is representative for active and former cotton textile workers in that community.

However, many persons on the employment lists could not be traced; probably most of these left the mills and moved away. They may have moved to find jobs elsewhere, or they may have moved to a better climate. Since we studied persons 45 years of age and older, the first

motive is probably infrequent. Also, we were more likely to trace active rather than retired workers. The prematurely retired men whom we studied had lower function values and more symptoms than the men who were still active in the mills. Therefore, those we could not trace may also be a group biased in favor of diseased subjects. If so, our data underestimate the true prevalence of chronic disease among the total population at risk. In a similar study of hemp workers in Spain[8], disabling lung disease among men was more prevalent than it was in the present study.[14]. We know that hemp dust is more toxic than cotton dust[33], but it is also possible that we were better able to trace older disabled men in Spain, since few of them had moved away.

We are confident that the differences in lung function between textile workers and controls reflect excess loss of lung function among the textile workers. All methods were standardized and identical for textile workers and controls. Throughout all studies, our MEFV curve recordings were calibrated every two hours with a device that accurately reproduces a standard MEFV curve[12]. In addition, the computer methods are inherently more accurate than methods which rely on analog readouts and graphical recordings. Flow measurements with the computer system are accurate to about 0.3%; the system reproduces the $FEV_{1.0}$ of the calibration device to within 0.6%[12]. Hence, we minimized technical sources of error.

The data on respiratory symptoms and lung function indicate an excess of chronic lung disease among the cotton textile workers (Table 4, 7, 8). It is almost certain that the difference in lung function and in symptom prevalence between textile workers and controls is caused by dust exposure of the workers in the mills. For the symptoms, the weighted least squares analysis indicates that work in mills is the prime variable—the only one for dyspnea grade 2+—while smoking is a contributing

factor for cough, phlegm and wheezing. For lung function, the differences between workers in risk jobs and in other jobs (Table 8) suggest that the lung function decrements are caused by exposure to dust. For both symptoms and lung function loss, the differences between textile workers and controls persist when sex, age and smoking habits are taken into account. Other factors (e.g., urban air pollution, indoor air pollution, altitude) have been considered and may be excluded. Within our control populations there are no systematic differences in lung function that might be related to urban air pollution outdoors[31]. Indoor air pollution has so far not been linked to excess airway obstruction, e.g., among nonsmokers who live in homes with smokers[30]. All subjects lived at similar altitudes, near sea level.

It is important that the small group of textile workers in other jobs, not exposed to dust, was similar to the control subjects in other communities. The workers at risk and those not at risk were studied on the same days and with the same methods, and lived in the same community under similar conditions. Thus, we can exclude the possibility that the textile worker population as a whole differed, for some unknown reason, from the control populations. The differences in lung function are related to specific jobs in the mills, not to some unknown characteristic such as social class of textile workers as a group.

We found an excess of chronic lung disease not only among carders and spinners—groups long known to be at risk of byssinosis—but also among yarn preparers and weavers. It has frequently been stated that byssinosis is absent or uncommon among weavers. However, a detailed study of one mill showed that most weavers in a factory which produced heavy cloth from unsized yarns had byssinosis[5], and in a more recent study[24], the average prevalence of acute byssinosis symptoms among 431

workers in slashing or weaving was 13.1% (36.5% in a subgroup exposed to high dust levels).

The excess of chronic disease among textile workers might be overestimated if the control populations were biased in favor of healthy persons. However, we have evidence that our control subjects provide an accurate picture of the respiratory health of the total populations in their communities[26]. The prevalence of key respiratory symptoms in our control subjects is roughly similar to that in other populations not exposed to major risks of occupational lung disease[1, 28]. Furthermore, the negative lung function residuals among most subgroups of control subjects (Table 7) reflect the inclusion of diseased persons and smokers.

Chronic lung disease among cotton textile workers is obviously an important public health problem. Among those who retired before the age of 65, 18% gave chest symptoms as the prime reason. Of all textile workers, 5.0% of those aged 45-64 years, and 17.4% of those 65 years and older, had $FEV_{1.0}$ values of 1.20 liter or less, i.e., values consistent with considerable disability in most instances. On the basis of these data, and of employment figures in the U.S. cotton textile industry, we have estimated that about 35,000 men and women in the U.S. suffer from disabling lung function loss as a result of their work in cotton textile mills[14]. This figure may be too low, since we may underestimate the prevalence of chronic lung disease among the total population of workers at risk (see above).

* * * * *

EXHIBIT 143 APPENDIX F

The economic structure of the textile industry

By JORDAN P. YALE *

FOR MANY YEARS, particularly during the 1960s and early part of the 1970s, the business cycle lost its serious impact on the economic life of not only the nation, but also on the textile and apparel industries. This change came about not because the effect of the business cycle disappeared from our business dealings, but because other influences became more dominant. The most significant of these was the element of growth. During this period, growth dominated the economic climate, having moderating effects on cycle fluctuations. The business cycle was ever present; however, it was not felt or manifested in plant closings or massive worker layoffs.

In terms of the national economy, there were two primary factors that contributed to the softening effects of the cycle: 1) The existence of regulating legislation (minimum wages, unemployment benefits, rigid monitoring of banks and stock market), and 2) Improved management techniques (extensive use of short and long range planning and inventory control). In addition, the textile industry had some other important considerations in its favor namely, the innovative breakthoughs introduced by the synthetic fiber industry (by means of which textile markets expanded) and the growth in the share of synthetic fiber consumption. The growth in the consumption of synthetic fibers with their relatively stable prices reduced the need for speculation by textile mill management. Also, during this period there was

---

* Dr. Jordan P. Yale is president of Statistion Corp., P.O. Box 246, East Norwich, N.Y. 11732 (516 922 0382), publishers of the quarterly journal Textile Business Outlook and of the recently completed multi-client study Polyester Staple Growth. 1932-1935. He is also a textile economics consultant.

a significant increase in the consumer's propensity to spend on textile articles. This increase in expenditures was the result of the changes in the demographic composition of the population (faster growth of the younger group, greater personal income, changing life styles and other factors).

In a previous article, "The Textile Business Cycle," which appeared in the July 1975, MODERN TEXTILES, the

---

Textiles, one of the nation's oldest industries, is currently undergoing a renaissance that could transform it into one of the leading U.S. industrial sectors. A noted consultant and forecaster tells why.

---

behavior of the textile cycle was described. Since then, the Federal Reserve Board, the raw data issuing agency, has made major revisions of the current and historical data. As a result, it is one of the aims of this article to redefine the textile cycle, to also describe the apparel production cycle and to compare them both with the national cycle as defined by the F.R.B.'s Total Industrial Production Index. These comparisons have revealed for the first time the importance of the cyclical timing of both the textile and apparel industries: *They both lead the national economy in predicting cyclical changes, and therefore both can be classified within the group of leading indicators of national activity.* Prior to the period under study, the textile cycle was lagging the national cycle. Also, a comparison will be made between the U.S. textile cycle and the textile cycles of a number of countries around the world in order to determine the existence of any relationship in their timing.

Further, it is the aim of this article to define the primary reason which has contributed to the growth of

the textile industry. For the period starting in 1960, and up to the present, the chief factor contributing to this growth has been the "consumer" who has spent large sums on textiles, significantly more than accounted by management. As a result of the large expenditures, total per capita fiber consumption has been increasing.

In recent years, the classical or economic description of the textile industry as a "sick" industry does not hold water anymore. This industry is dynamic and it is one of the few industries outside the space/industrial complex that has experienced a relatively high degree of technological inroads.

In this article, a description will also be made of an economic model of the textile industry, identifying the significant input-output relationships between the business elements (petrochemical, fiber producers, apparel manufacturing, etc.) that have a bearing on the well-being of this industry, and in turn they are affected by it.

Finally, in this article a presentation will be made of the latest short term economic forecasts relating to the industry.

Cyclical Changes

Business cycles are defined as fluctuations in activity of duration longer than one year. The length of the cycle can be measured as the distance between two consecutive low (or tough) points, or two high (or peak) points. Measuring the length of a cycle between two tough points provides a greater degree of reliability in such lengths.

Even though our discussion in this section will center on the economic behavior of the textile industry as measured by the F.R.B. Textile Mill Prod-time, identifies the sum total of these textile expenditures. They are significantly larger than are commonly thought to be.

a) *"Consumer" Textile Expenditures—A Hidden Colossus*: Earlier it was demonstrated that most of the socio-economic variables are positively correlated with the consumption of apparel, homefurnishings and during the last 10 years with industrial end use applications. Therefore, as these variables grow, the textile industry also grows. As shown earlier in Figure 1, the textile industry has been experiencing growth for many years. In contrast, it is often heard that over the years the consumer is spending a declining share of his expenditures on textiles.

This article takes an issue with such an assumption. It is believed, and will be demonstrated for the year 1974, that the share of consumer expenditures on textiles is far greater than what it normally is assumed to be. There are also indications that this share is increasing.

There is a misunderstanding about the nature of consumer expenditures directed to textiles. This confusion is related to the statistical record normally released by the Department of Commerce. The reported purchases deal only with direct consumer expenditures on *apparel* textiles as well as some of the other major types of expenditures. Major textile purchases, such as carpeting, etc. should be classified as textile expenditures but are currently classified under homefurnishings along with appliances and furniture. There is a significant quantity of other textile material such as upholstery fabrics, threads, fiberfill, linings, tire cord fabric and others that are an integral part of another fabrication and not included under textile expenditures. For instance, tire cord represents a better than 600 million pound fiber market but its retail value is included within other tire components (rubber, metal and others) and, of course, sold as tires.

Another large market, draperies and upholstery (including those used in vehicles) is largely disregarded in

the calculation of direct textile consumer expenditures. This market (primarily the upholstery material) is included with the consumer expenditures on furniture. There are many other end use applications which "hide" their textile contents and therefore contribute to the understatement of direct textile consumer expenditures. End uses, such as reinforced plastics (approximately 500 million pounds), electrical applications (41 million pounds), and many others, are not considered. It is apparent, therefore, that a significant portion of textile materials is not counted as textiles at the retail level, but is included as part of the retail value of other types of consumer expenditures. It is difficult to estimate the exact amount of consumer expenditures on *all* the textile materials, and, particularly for textiles, that are used in industrial applications. It is safe, however, to assume that the industrial portion of use of all textile material is small.

Based on a number of assumptions, an estimate was made of the total "consumer" expenditures on textiles, directly and indirectly. The word *consumer* in the context of the present analysis not only includes the direct purchaser of textiles at the department or other retail stores, but also the processor who buys textiles for further use (such as the furniture, automobile manufactuers, along with the methodology used in arriving at it, are shown in Table VI. The conversion factors in the table have been derived very carefully, but there could be some difference of opinion as to their magnitude.

The main conclusion reached in Table VI is that "consumer" expenditures on all textile items (direct and indirect) as a percent of total expenditures, have been seriously underestimated. According to the U.S. Department of Commerce, the consumer spent $65.2 billion on clothing and shoes in 1974, a share of 6.62% of his disposable income. (Please note that part of this share

belongs to shoes.) According to the estimates shown in Table VI, the "consumer" in fact had spent a total of $129. billion on all types of textile goods in the same year. These expenditures are also "pure textile" and do not include expenditures on shoes or other items. The ratio of the calculated textile expenditures to total disposable income in 13.11%, approximately twice the amount calculated from the USDC data. The textile industry is capturing a far more significant share of the consumer expenditure dollar than is currently recognized.

The breakdown of the consumer's textile dollar at retail equivalent value according to the three major market areas is shown in Figure 3. Expenditures for apparel represent a 55% share, while expenditures on home furnishings 33% and expenditures on industrial end uses 12% of the total textile dollar.

The fact that total consumer expenditures on textile are far larger than recognized, with the possibility that they are increasing over the long term, is also supported by the trends in total per capita fiber consumption, shown in Table VII. Here, again, a different basis is used in measuring per capita consumption. This consumption is at the mill level and in addition to domestic shipments and imports of fibers, includes other natural fibers such as silk, linen, jute, sisal and others.

Finally, it also includes the consumption of waste fibers. Based on the calculated total fiber consumption, the per capita rate is 54.5, 43.9, 54.0 and 58.6 pounds for the years 1950, 1960, 1970 and 1974. Based on the traditional measurement of per capita fiber consumption, the rates are 44.7, 35.6, 46.1 and 51.6 pounds, respectively for the previously mentioned years. The total per capita fiber consumption is given, annually, for the period 1950-1974 in the graph in Table VII. Trends in per capita fiber consumption indicate that the lowest consumption was reached in 1958; since that time the per

capita rate has been increasing. It appears that trends in per capita fiber consumption are also subject to cyclical fluctuations. It is expected that growth trends experienced during the past few years will continue, and by 1985 the per capita rate is estimated to reach 80 pounds.

The Influx of Technology

If the degree of innovative effort can be measured by the dollars spent on research and development, the textile industry would then be classified as a "poor innovator". The textile mill products industry, however, has been the beneficiary of research and development efforts carried out by the fiber industry, the domestic, as well as foreign, machinery manufacturers, the dyeing and auxiliary chemical industries and a number of other industries.

During the past few years, there have been some major technological breakthroughs which were felt in the following areas:

1) A continuous manufacturing process flow, in contrast to an intermittent one.

2) Drastic reduction in the number of processing steps and in the number of equipment. Use of equipment with higher speeds.

3) Drastic reduction in manpower.

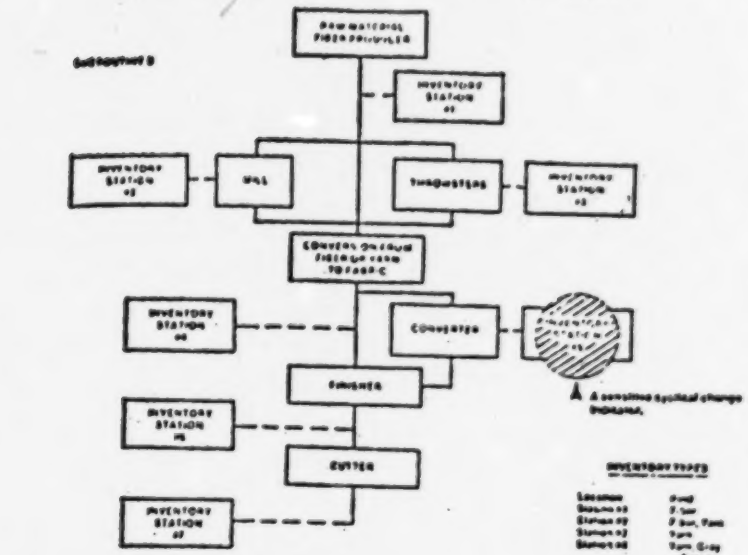
4) A gradual shift in the job content, from one requiring primarily manual skills to one requiring electromechanical skills.

As a result of these major changes, the textile industry is currently in the early stages of a long-term overhaul which will alter the industry from a labor intensive force to a capital intensive force. The direct beneficiaries of these changes will be both the worker, who with his increasing productivity and expanding skills

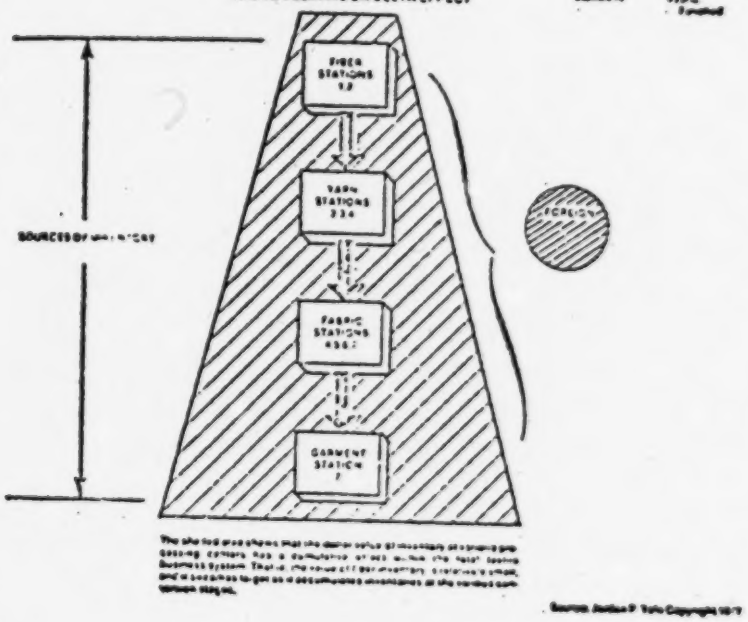
will receive considerably improved wages and benefits, and management, which will improve its overall profitability.

FIGURE 8

SCHEMATIC DIAGRAM OF SHIPMENTS AND INVENTORY ACCUMULATION



TEXTILE INVENTORY PIPELINE
THE CUMULATIVE OR DELTA EFFECT



The key to these changes is the adoption and use by the mills of technologies and equipment currently available in the market place. The major centers of new mill technologies will be discussed in the following section.

A) *Mill Processing Technologies*: The main objective of a mill processing system is the conversion of a mass of fibers into a yarn and fabric and is dependent upon fiber properties. One of the most critical properties in the conversion sequence is fiber growth. There are many conversion systems, and they seem to fall into three major groups, as shown in Figure 4—Part A, Part B and Part C. Part A describes the various processing systems that are used in the conversion of fiber into a yarn or directly into a fabrication. Part A is further subdivided into Systems, I, II and III and a general description of these systems follows.

1) *Conversion Systems*:

Part A: Conversion System I. Staple Fiber to Yarn: The traditional spinning system deals with the conversion of a loose form of fibers into a yarn. The staple fiber can be either naturally grown, synthetic or garnetted (recycled from old garments, yarn or fiber waste). Since cotton is naturally tangled and contains large amounts of foreign matter, the traditional cotton system subjects cotton fibers to a severe treatment. The same is true for the worsted and woolen systems. Due to the content of significant amounts of grease and other foreign matter, wool is first required to be scoured for the removal of grease, and then carded for opening up the fibers and rearranging them parallel to each other.

The advent of synthetic fibers produced a fiber with unique characteristics. The mass of fibers was clean, parallel and of uniform length. This new form of raw

material eliminated the need for excessive treatment and resulted in the development of new modified processing systems. These systems are the modified cotton system, the tow-to-top, Mackie and American systems.

Yarn Spinning Technology: After a thrust of technological innovation which took place many years ago, technological progress within the textile industry practically came to a standstill. During the past 25 years, there have throughs, such as improvements in long drafting, development of yarn texturizing, tufting and various non-woven processes, including needle punch. In the last five years, however, a number of important mechanical innovations have become a commercial reality. *These developments are expected to change the structure of the industry from labor intensive to capital intensive.* In one recent development, open end (OE) yarn spinning, the drafting apron is replaced by a rotor which results in a significant increase in yarn production. In another technological development concerning weaving, the introduction of shuttleless weaving looms which can be run at higher speeds than previously used looms has resulted in the reduction of production costs.

There is currently a considerable concentration of technological activity on the creation of new yarn spinning technologies. In addition to the OE spinning, there is also a newer development involving the Polish air vortex open end spinning system.

Part A. Conversion System II. Filament to Filament Yarn: This conversion procedure deals primarily with filament yarns (with the possible exception of core yarns where a yarn is formed by wrapping stable fibers around a filament core, or vice versa). The important development in this section is the growth of texturized yarns, primarily that of polyester filament, with their multivaried end use applications.

Part A: Conversion System III. Staple Fiber to Fabrication: The primary method of producing fabrications directly from the fibrous state is by means of the various processes shown in Figure 4. Non-woven fabrics are fibrous structures and the fibers are held together by means of mechanical friction or chemical bonds. Flocked fabrics are formed by bonding tufts of fibers on a fabric substrata. Batting structures are formed by inserting loose fibers between fabric enclosures. Needle punch fabrics are formed by means of a needling action.

Part B: Conversion System IV. Yarn to Fabric: This conversion system depicts the major processes followed in the utilization of yarn for the manufacture of different forms of fabrics. Knitting primarily utilizes filament yarns. For instance, in warp knitting, used primarily for women's undergarments, nylon and acetate filament are the predominant fibers. In well knitting, used principally for outerwear garments, the main fiber used is polyester textured filament. There is also a significant volume of acrylic used in sweaters and men's hosiery. The volume of polyester staple consumed within knitting is small. The tufted process is used primarily in the manufacture of carpets. Recent developments in fine gauge tufting could make this process available to producing upholstery fabrics.

Braided products are ropes and twine, while the Mali and lace processes are used on specialty fabrics.

Part C: Conversion System v. *Polymer to Fabrication:* In recent years there has been many attempts to manufacture various fabrications immediately after the extruded filament leaves the spinneret. For instance, polyester filament is converted into a spunbonded construction in this manner. Other processes deal with the transformation of polypropylene film into a tape yarn, and its use thereafter in carpet backing and ropes. In more recent

years, attempts have been made to produce end uses, such as carpets, by means of molding. In this process, the polymer is poured between two open strata and formed into two flat surfaces connected by means of rod-like threads. These threads are then sheared, leaving two separate tufted surfaces ready to be used as carpets.

Summary Comments: During the post World War II era, and more particularly since the 1960's, there have been significant breakthroughs in the availability of new yarns (tapes, films, etc.) and fabrics. New fabric formation processes, such as tufting, texturizing, non-woven processes, looms, automatic screen printing, transfer printing, computer assisted designs, new dyeing and finishing processes, have contributed toward: 1) Reduction in the processing length: 2) reduction in labor requirements; 3) increased productivity; and 4) introduction of automation.

The new technology introduces a radical change over the existing technology. For instance, OE spinning frames have radically different drafting zones than the conventional spinning frames. Spunbonded fabrics are radically different structures than the woven fabrics. Transfer printing is a radically different process than roller or screenprinting. This is also true for many other technologies. Most of the new technologies are so radically different than the existing technologies that it is possible to describe the textile industry as one of the few industries, outside of the space/industrial complex, that has experienced a relatively high degree of technological inroads.

Our discussion up to now has indicated that the textile industry has gone through a major transformation over the past few years. It has become a stable industry, combined with growth, a significant technological infusion and a very receptive "consumer", spending significant sums for the purchase of textiles.

There are two ways of looking at the textile industry, one is according to the definition used by the government. This offers a narrow point of view while serving statistical survey purposes. The government's view is short sighted and can even be called myopic from a business point of view. The other view in looking at the textile industry is as a conversion system, taking in raw materials at one end and creating textile consumer values at the other. This topic will be discussed in the following section.

The Statistikon Textile Economic Model

A) *Industry Organization* *: The ultimate objective of the sequence of manufacturing steps from the raw material to the final garment is the creation of a product that will appeal to the consumer and thus create a desire for the purchase of the garment. In this sequence of manufacturing steps, there are several management decisions to be made affecting the various products. These decisions influence the final success of the end use. A listing of such major decisions is as follows:

1) Decisions regarding the process of manufacture that would be suitable for the quality of materials, starting with the raw state to the finished garment.

2) Adjustments made in the various processing stages to accommodate the variability of materials.

3) Proper pricing decisions for the purchase of raw materials for immediate needs and protection against fluctuation of future prices.

4) Decisions regarding the flexibility of the equipment used. It is possible to build a manufacturing process that

---

* Jordan P. Yale Innovation: The Controlling Factor in the Life Cycle of the Synthetic Fiber Industry. A Ph.D. dissertation, New York University.

would handle only a certain type of fiber, such as cotton, wool, worsted, synthetics, or any other single type of fiber. If the processing system is not made flexible to accommodate several types of fibers, management might be forced to use an obsolete processing method.

5) Decisions regarding production of future fabrics, as to the type of construction and style to be produced. This decision is very important for the apparel type of fabrics. It will prove very costly if a mill fails to make the proper market appraisal.

6) Decisions regarding the manufacture of a garment. A garment cutter must first decide what would appeal to the consumer before he starts producing it. There is usually a time lag of more than four months from the purchase of the fabric and the delivery of a garment.

The extent of influence of any of the above decisions is not limited to the immediate area that called for that decision. A decision for instance on any aspect of quality * * * * * * * * * have a broad effect on fabrics and garments made from it. Likewise, a decision based on the manufacture of a garment will have a feed-back effect on the fabric and eventually on its raw material components. If the garment sells successfully, then obviously fabric production and raw material consumption will increase. If the sale of a garments is not successful, the reverse will be true and fabricated fiber consumption will decline. As can be seen, then, a certain close inter-group relationship and dependence exists between all the factors of production, from the textile raw material supplier to the finished garment manufacturer. All the functional groups involved have a single common objective, the sale of textile goods to all types of consumers.

Since there is such a common purpose, whether recognized by the industry or not, a definition of what is meant

by the expression "textile industry" should include *all aspects of textile material conversion activities.* The current industry definition is weak: it creates an atmosphere of vagueness. Textile industry means textile mill products, and certainly these two terms are not the same. In the following section, the discussion will extend, clarify and amplify the problem of the definition of the term "textile industry".

B) *Weakness of Definition "Textile Industry":* There is not, as yet, a comprehensive definition of the textile industry. The definition given by the Office of Management and Budget describes technically only a segment of the overall textile industry. According to this definition, textile mill products and its implied synonymous term "textile industry" are described as follows:

> "This major group includes establishments engaged in performing any of the following operations. 1) preparation of fiber and subsequent manufacturing of yarn, thread, braids, twine and cordage, 2) Manufacturing broadwoven fabric, narrow woven fabric, knit fabric, and carpets and rugs from yarn. 3) dyeing and finishing fiber, yarn, fabric and knit apparel 4) coating, waterproofing, or otherwise treating fabrics, 5) the integrated manufacture of knit apparel and other finished articles from yarn, and to the manufacture of felt goods, lace goods, bonded-fiber fabrics, and miscellaneous textiles.

This Bureau of Budget definition is strictly oriented to manufacturing and serves the purpose of facilitating statistical surveys. It is production oriented, and only partially at that, and fails to cover the manufacturing or supplying of raw materials and the manufacture of clothing. What the industry needs, however, is a definition that parallels the industry objective—the objective of creating more textile sales. In other words, we need a *business definition* of the industry.

* * * * *

It is important for the textile industry leaders to recognize that the above actions have to be taken in the very near future since there already exists a market momentum favoring textile consumption.

The past development of textile economic matters has been favorable. With the last cycle, however, new national economic problems have emerged, i.e., inflation in conjunction with high unemployment. The near-term effect of both factors will be that there will be a moderating effect on economic growth. Our concern, then, will turn to the evaluation of the short term economic climate for the U.S. and eighteen foreign countries. The economic appraisal will deal with national economic parameters, as well as textile. The discussion on this topic follows.

Short Term International Economic Expectations

During the first quarter of 1975, the botton of the previous cycle was reached and since that time the national economy, textile and apparel industries have been experiencing an economic revival. The improvement in business conditions has not been smooth. Activity for all indicators expanded rapidly at first, but then seemed to falter. This faltering lasted until the last few months, where upon a new business revival, spirit took hold. The national economy did not run the risk of falling into a recession again. What happened is that the economy went through a correction period resulting from: 1) adjustments made due to strikes (primarily in the automobile and tire industries); 2) adjustments in the inventory levels, particularly unique to the textile industry; 3) adjustment in fashion trends, such as in the case of double knits; and 4) adjustments which were necessary due to the energy crisis.

It appears that the national economy has entered a phase of reduced growth, and as a result the effects of any business disclocations, such as inventory adjustments or

other types of changes will make a more pronounced effect on the economy.

Currently, the economy has resumed its growth. The negative psychological impact of the significant inflationary trends has lost ground in the consumer's, as well as the businessman's, mind Both have confidence in the economy, as well as the government. An indication of this confidence is reflected in current increases in consumer in-

TABLE IX: Resources Demand, Estimated
Petrochemicals and wood pulp (million pounds)

Type of fiber and material	1976	1977
Polyester		
DMT	2,748	3,125
PTA	759	868
Ethylene glycol	1,550	1,768
Nylon		
Cyclohexano	1,556	1,743
Duladiene	678	759
Acrylic		
Acrylonitrite [1]	1,025	1,146
Comonomer	91	102
Olefin		
Proplyene	664	746
Acetate (filament only)		
Acetic acid	223	241
Wood plup	216	234
Rayon (staple only)		
Wood pulp	570	628
Energy demand, synthetic fibers (kw-hrs. millions)		
Polyester	5,333	6,084
Nylon	4,332	4,853
Acrylic	2,221	2,490
Olefin	949	1,067
Acetate	1,749	1,894
Rayon (staple only)	2,475	2,723

[1] Includes the quantities used in nylon manufacture.
Source: Statistikon

stallment purchases. The consumer's attitudes towards the selection of goods and services is dynamic. During the early part of the inflationary period which began in 1973, the consumer abstained from expenditures on durable goods, as well as on apparel. His major expenditures were directed to food and gasoline. In the last few months, however, the consumer has returned to purchases of durable goods as well as textiles.

In was mentioned earlier in this article that the textile industry has, for a number of years, been the beneficiary of the socio-economic changes that took place in the economy. These changes resulted in a significantly greater percent of income spent to textiles with the net result of an increase in the per capita fiber consumption. The consumer has identified himself with textiles, as explained earlier in this article. Expenditures are dynamic and are subject to change when the consumer is faced with alternative outlays. Therefore, one of the primary functions of the textile management should be to maintain and further stimulate this consumer bias towards textiles.

Economic expectations for the year 1977 and partially into 1978, for a select series on the national economy and the textile industry in the U.S. and selected countries around the world, are presented in Table VIII. Actual shipments of the major fibers as well as their capacities for the period 1969 to 1976, with forecasts for the year 1977, are shown in Figure 9. On the same figure, along the graphs there is also a tabulation of the percent utilization of fiber producing capacities. The calculated demand for fiber petrochemicals, wood pulp and energy requirements to produce the indicated fibers is shown in Table IX. In general, demand for synthetic fibers, petrochemicals, energy and utilization of capacities is expected to increase during 1977. For the U.S. and the selected countries, the year 1977 will be a year of national and

textile business expansion (an exception to this is with textile business activity in Norway and the United Kingdom).

In the U.S., total expansion (GNP) for 1977 is an estimated 10.5% over 1976. This expansion is measured in current dollars. When this is converted to real dollar terms, the expansion will be an estimated 5%. This expansion will be balanced between all segments of the national economy. Real income expansion will be one of the stimulating forces for this total expansion and in addition to real income's normal growth, further expansion will be caused by the expected reduction in the growth of inflation and the upcoming tax rebate. Other stimulating forces will be the increase in total housing starts, expenditures on capital goods and various governmental programs.

Conclusions

The textile industry, one of the oldest industries, is experiencing a renaissance. The ingredients of making this industry one of the leading industries in the nation are there: economic stability, significant consumer support and major technological influx. There are some factors that still have not caught up with the industry's new status. Profits are still low, however, these are a function of the degree of adoption of the new technology. This is a matter of time. Productivity is relatively low. This poor performance is primarily related to the high labor turnover. Even though the industry is exposed and adopts technology developed outside, the industry itself is not very innovative. This factor should change. The industry has a poor public and business image. This is unjustifiable today because the textile industry is "sick" no more.

EXHIBIT 143 APPENDIX G

Article from *Textile World*

March 1977

USED CHUTE-FEED SYSTEM FOR CARDING SAVES SPRINGS $45,000 A YEAR

Machinery headed for storage got a second life in the Frances operation. Move got rid of unpopular jobs, eliminated 12 cards, and boosted output 10%. Chute feeding for cards pays off, whether the machinery is new or used. That's the experience of Springs Mills as it lived by its slogan, "maximum utilization of existing equipment."

The Frances plant, Fort Lawn, S.C., became the beneficiary of equipment removed in remodeling of another Springs plant. Originally, the machinery was ticketed for storage. Instead, Springs sent the entire chute-feed system to Frances and put it back to work. Here's what the move accomplished for the company:

° Reduced total cards in place from 36 to 24.

° Increased carding output by 10%.

° Saved an estimated $15,000 (annualized) by reduction of five jobs (a big plus in the current tight labor situation by cutting supply and repair costs at carding and picking by improving card sliver quality, etc.

Springs completed the installation of the used equipment at Frances at a fraction of the cost for new equipment. (Based on new equipment costs, Springs estimates the installation at Frances would have cost $2 million.)

In the process, Springs eliminated many of the big-muscle, unpopular jobs associated with lap handling.

Changeover began with removal of the calendar section from Frances' single-beater pickers (Hergeth). Springs put the vacuum system over the picker front to pick up the stock sheet and transfer it through ductwork to feed units at the card backs.

As cards, the feed units pass stock through a pair of guide rolls into the main card feel roll. Feed units have shaker plates and photoelectric controls to maintain necessary feed stock levels. As a safety precaution, ductwork has in-line, infrared smoke detectors.

Each of three pickers supports 10 cards (will support 12 if the need arises). Each duct line has by-pass valves that give the polyester-cotton blend plant almost infinite variation in the number of cards on each stock.

Frances got a big boost by bringing card production in balance with spinning requirements. With cards now averaging about a 40-lb. hr- (1S-kg/hr-) output, compared to an approximate 25-lb. hr- (11.25-kg/hr-) production in the old system, spinning no longer overruns cards.

Evener motions (Uster) at card fronts maintain sliver-weight levels within close tolerances and improve quality throughout the plant. In addition, thick-thin places and chokes, generally associated with lap laying and resultant damage to the card wire, have been eliminated. So have the expense and trouble of picker-front maintenance and repair, especially in the costly stack-roll area.

Another benefit is that the system itself keeps dust and lint confined within the chutes, therefore maintaining a much cleaner in-plant environment.

EXHIBIT 193, APPENDIX H

Daily News Record, May 20, 1977, p. 19

TOYODA O-E SPINNERS ACQUIRED BY 3 US MILLS

By Ralph Reynolds

CHARLOTTE—Three integrated U.S. textile mills have purchased second generation Toyoda open-end spinning frames with capabilities of spinning finer counts and consuming less energy than its predecessors.

The new systems were unveiled Thursday at a Tekamtex, Inc., open-house.

In an interview during the two-day open-house to acquaint the industry with the new machines, Toyoda product manager Sam White told DNR that three integrated textile plants in the U.S. had been operating the new open-end equipment for about two months. He refused to identify the mills.

White said a Model HSL 110 was in mill operation, spinning 5s to 10s in 100 per cent synthetics, a Model HSL 310, with trash removal on 10s, 100 per cent cotton, and a Model HS 120 spinning 30s to 40s of 100 per cent cotton.

According to White, the HS 120 is designed to run finer counts, up to 45s, economically at higher rotor speeds, up to 50,000 rpm on a 50-mm diameter rotor. This compares with a 65-mm diameter rotor on the existing Model BS machine, of which there are over 200 operating in the U.S., he said.

The break-even point in spinning on the new version is in the mid-30s count range, compared with the 20s range on the older Model BS. "The HS 120 could

open new doors in finer counts for such applications as print cloth and gauze," White said.

White estimated the cost of the HS 120 as about $450 per position, compared with about $350 for the Model BS. The Model HS has 200 rotors.

Responding to a query on energy savings through less power consumption, White cited as an example the HS 120 with the smaller rotor operating at 45,000 rpm, 200 positions would use the equivalent power of a Model BS with 200 positions at 36,000 rpm.

The HSL 310, the larger diameter rotor for coarser counts in the 3s to 30s range, costs approximately $700 per position with the trash removal device, about $600 per position without the device. By comparison, some competitive open-end spinning machines with trash removal are quoted at up to $1,000 per position. The HSL series has 140 rotors.

White said the addition of the trash removal device didn't change the Toyoda philosophy of the need to clean prior to open-end spinning, but offered the customer a choice. Using the trash removal device on equivalent stock, the rotor cleaning cycle can be extended about three times so that if one is normally cleaned once each eight hours, it could go to once every 24 hours, White explained.

Also offered on the HSL series is capability to take up on a 3 degree, 30 minute cone, 5x12-inch diameter, 7.5 pound package on cotton, in addition to the standard encese. The 14x36-inch can hold about 31 pounds of cotton.

Also optionally available are a tailing transfer device and a waring attachment.

In addition to the second generation of open-end spinning, Tekamtex showed its Model CKW tandem card de-

signed for production speeds to 100 pounds per hour (pph) and featuring efficient removal of microdust, and the Model CK-7C single card for 100-110 pph production. The cards are said to provide efficient trash and dust removal resulting from the special design around the lickerin, plus the type and arrangement of the wire card clothing, White said.

A planetary coiler is offered for the first time on the cards and an autolevelling device will soon be available, White pointed out.

The Model D-2PL drawing frame, also on display, uses 9.12 or 14-inch diameter cans. Equipped with the pantograph system to compress silver, about 50 per cent more stock can be fed into the cans than with conventional systems.

Also attracting attention from textile executives, according to White, was the Model FL-6 roving frame, which has a semiautomatic doffing mechanism that cuts doffing time to one-half that of conventional frames.

* * * * *

EXHIBIT 160

Post-Hearing Comment of the American Textile Manufacturers Institute, Inc.

* * * * *

III. *Medical Surveillance*

In regard to medical surveillance of employees, it is clear that the standard which ultimately issues should include requirements regarding a medical surveillance program. The threshold question is whether employers should be required to institute and maintain the medical surveillance programs or whether some outside agency should be responsible for the implementation, administration and maintenance of such a program.

In view of the evidence of record, it is submitted that there can be little question that the textile industry is capable of administering medical surveillance programs for its employees in regard to their exposure to "cotton dust." As a matter of fact, a considerable portion of the evidence of record regarding all aspects of the standard, but particularly medical surveillance, was submitted by medical directors of companies in the industry who have instituted and administered medical surveillance programs for a number of years.[57] In the face of the foregoing, there is no justification for any approach other than that of the companies in the industry maintaining their own medical surveillance programs whether these programs are under the supervision of the medical directors of the companies or utilize physicians, specifically pulmonary specialists, who are not in the employ of the company.

It is recognized that any medical surveillance program regarding employee exposure to cotton dust must, in view of the definition and categorization or classification of

the varying symptoms of byssinosis, require the administration of a questionnaire and pulmonary function tests. These two requirements, however, must not and cannot be utilized, as is apparently the approach in the Proposed Standard, as a substitute for the exercise of a physician's independent medical judgment in the diagnosis and treatment of employees. Regrettably, the Proposed Standard appears to take a "by the numbers" approach in regard to the medical surveillance program and makes every effort to "quantify" specific levels or changes in pulmonary function requiring additional action which are completely unrelated to the *individual*'s pulmonary function. This approach is particularly evident in regard to the utilization of predicted values set forth in Appendix C to the Proposed Standard.[58] It is submitted that these predicted values should not be utilized. This particular issue will be treated in some detail below. At this juncture, it will suffice to point out that there was considerable evidence produced at the Hearing that the predicted values set forth in Appendix C of the Proposed Standard bear little if any relation to the predicted values encountered by the textile industry.[59] Moreover, the utilization of predicted values raises the issue of the treatment of the significant difference in lung function between races,[60] a differential which received considerable attention at the Hearing and for which, other than a flat percentage adjustment such as reflected in the Proposed Standard,[61] there appeared to be no viable treatment. It is clear, however, that without such adjustment an enormous number of black applicants will be rejected by companies in order to avoid any possibility of continuously retesting (every six months under the Proposed Standard [62]) employees who, based on their own racial characteristics, do not indicate a deficit or decrement in pulmonary function, but who are not within, for example, 80% of the predicted value in Appendix C.

A. *The Questionnaire*

As pointed out above, it is recognized that the administration of a questionnaire should be required as part of any medical surveillance program in connection with employee exposure to "cotton dust." A number of critical issues, however, are involved in the nature of the questionnaire, the intervals between which such questionnaire should be given, the efficacy of continuous repetition of the questionnaire and the importance which should be ascribed to the subjective responses to the questions, and, finally, by whom the questionnaire should be administered.

Initially, it must be emphasized that the questionnaire must be regarded *solely* as a tool to aid the supervising physician in the diagnosis and treatment of the individual. This is particularly true in regard to the subjective responses which would indicate that the individual has the subjective symptoms of Grade ½. As pointed out above, Grade ½ has questionable validity and certainly should not be considered as a conclusive diagnosis of byssinosis.[63] Further, the use of questionnaire is subject to a multitude of variables, including the employee's recollection (particularly in regard to Grade ½'s "occasional" chest tightness on Mondays), the objectivity of the administrator of the questionnaire, the variability of results obtained by varying inflections utilized by the interviewer [64] and the fact that, in numerous studies, positive responses to the questions regarding chest tightness and/or breathlessness were elicited from employees who were not exposed and had not been exposed to cotton dust.[65] Moreover, from a clinical standpoint, the lack of correlation between the subjective responses to the questionnaire and the deficit or decrement in pulmonary function raises severe questions, notwithstanding the classical definition of the disease, as to the conclusiveness of the diagnosis, particularly in regard to Grade ½, and, thus, the appro-

priate treatment, surveillance or handling of the individual involved.

There can be no question that any medical surveillance program must, in regard to *newly hired employees*, provide for the administration of the questionnaire. A significant question arises, however, in regard to the repeated use of the questionnaire in view of the numerous problems associated with its administration, including, but not limited to, those set worth above. Specifically, a significant issue arises in regard to the duration of time between which the questionnaire is administered and particularly in regard to employees who exhibit signs of significant deficit or decrement in pulmonary function. The Proposed Standard requires the annual administration of the questionnaire and in the event the employee exhibits certain deficit in pulmonary function in regard to predicted values or drop in pulmonary function, as measured by FEV_1, post versus pre-shift, semi-annually.[66]

In view of the foregoing, ATMI submits that it would be preferable and appropriate that the questionnaire only be administered to employees at the time of their second annual pulmonary function testing following their initial employment. In view of the experience in at least one study even this interval may be too short to be of any value as the time may not be sufficient for the subjective reaction to develop and, thus, subjective response to be elicited.[67] Presumably, the questionnaire would be administered at the same time as the pulmonary function testing was done at the plant. Thus, although the question of the employees pulmonary function would be addressed annually, the time spent administering the extensive questionnaire and the difficulties associated with the repetitive use of the questionnaire would be minimized. For there can be little question at this juncture that the questionnaire should serve to identify employees with clear acute or reversible symptoms in order that

some action may be taken in regard to their situation, not for a conclusive diagnosis of their condition.

A similar approach should be applicable in regard to employees who are identified, as a result of *replicated* results from pulmonary function tests, as having significant decrement in post-shift versus pre-shift FEV_1, FVC or in *their* base-line measurements. These significant decrements or shifts are discussed below. In this regard it is submitted that, although these employees should receive pulmonary function tests more often than annually and should be followed closely on a clinical basis, it is unnecessary to repeat the questionnaire with these employees on a six-month basis as indicated by the Proposed Standard. The reason for this position should be obvious. It serves no useful purpose to continue to ask employees similar questions regarding their situation when that situation has already been determined.[68] Accordingly, at the minimum, the questionnaire should not be given to employees who exhibit significant decrements or deficits in the pulmonary function measurements set forth above except on an annual basis.

It must be emphasized that underlying the foregoing approach to the intervals between administration of the questionnaire is the basic fact that the questionnaire must be regarded as a tool of medical surveillance, not as a conclusive diagnosis,[69] and that *objective* evidence of the individuals condition, specifically pulmonary function tests results, are much more indicative, once the indivdiual is identified, of the individual's condition and its improvement or deterioration.[70]

It is apparent from the evidence of record that there is considerable confusion regarding the questionnaire which is set forth in Appendix B to the Proposed Standard.[71] Moreover, the validity of the questionnaire set forth in Appendix B must be questioned in view of the considerable testimony that the questionnaire was *not*

the British Research Council questionnaire, as modified by Schilling,[72] left out a considerable number of questions of definite relevance to the individual's condition as it related to byssinosis and the diagnosis thereof [73] and may or may not have been the questionnaire suggested by the British Occupational Hygiene Society in 1972.[74] Specifically, objection to the questionnaire is raised in regard to a number of questions which are omitted, particularly those related to allergies and asthma, the lack of questions regarding "cough" as to *when* the "cough" occurred on Monday and the addition of questions regarding the employee's subjective condition following return from vacation which, in the textile industry, is for at least one week and which all employees, with minimal exception, take at the same time.[75]

It is submitted that the questionnaire which should be utilized is either a questionnaire such as one submitted by Dr. Whitworth of West Point Pepperell [76] which would be uniformly used throughout the industry and which, although lengthy, provides considerable information concerning the employee's respiratory condition and, thus, permits a superior clinical evaluation of the employee's condition, including the possibility of byssinosis, *or* the British Medical Research Council questionnaire as modified by Schilling, in order to maintain some form of historical perspective and relationship to previous studies so that, in turn, the progress and efficacy of the implementation of any new standard may be evaluated. The proposed Appendix B satisfies neither of these alternatives as it, as pointed out above, omits numerous questions and adds new ones, thereby distorting any clinical evaluation and historical perspective. Moreover, the questionnaire set forth in Appendix B is so structured that it, on a comparative basis and particularly in view of the omissions regarding allergies, asthma and other respiratory problems, forces a "diagnosis" of byssinosis by preventing any other variable or possible problem to be ade-

quately considered. Finally, in view of the demonstrated lack of knowledge of the causative agent of byssinosis and a *precise* definition of the disease for purposes of diagnosis, clinical and otherwise, it is submitted that any questionnaire which, by its structure, limits questions relating to other forms of respiratory ailments and fails to pinpoint important factual information, particularly regarding the symptomatology or lack thereof on Mondays, must not be utilized. As Dr. Martin pointed out during the Hearing, it is inconceivable that an effort should or could be made to limit the number of questions of employees exposed to the "agent," in the broadest sense, causing a disease which has so many unknown factors.[77] Such approach is completely contrary to reason and will, it is submitted, do little to achieve the protection of employees from material impairment of their health which is required on either a humane basis of under the Act.

Finally, in regard to the administration of the questionnaire, there can be little dispute that persons, including nurses, technicians, and others, can, properly administer the questionnaire.[78] This conclusion is made, of course, with the *caveat* that these individuals are adequately trained to avoid the various problems, *e.g.* voice inflection, explanation of question, etc.[79] which could lead to distortions in the responses of the employee. The evidence of record is overwhelming, however, that the administration of the questionnaire can be performed by nurses, technicians, and lay personnel, if trained, as capably as physicians,[80] if not more so.

B. *Pulmonary Function Tests*

As in the case of the questionnaire, and perhaps to a greater extent, it is clear that the administration of pulmonary function tests for all employees exposed to "cotton dust" must be an integral part of any medical

surveillance program. Similar comments to those regarding the questionnaire must be made, however, in regard to the Proposed Standard's approach to the utilization of the results of the pulmonary function test, particularly as they relate to the application of predicted values for FEV_1 and FVC, including the "Prediction Nomograms" set forth in Appendix C of the Proposed Standard.

It is submitted that the utilization of the nomograms set forth in Appendix C and the requirement requiring "a detailed examination" for all employees whose FEV_1 is less than certain percentages of predicted values are totally inappropriate and must be rejected.[81]

First, the prediction monograms set forth in Appendix C are for a non-textile industry population [82] and, as clearly revealed by unrebutted evidence of record, bear no relation to white or black employees in the Southeast.[83] Further, the prediction nomograms of Kory *et al.*, those in Appendix C, have an enormous Standard Error of Estimate.[84] Substitution of other prediction monograms would, however, also be totally inappropriate in view of the lack of relationship to employees in the Southeast or because such monograms, such as those of Morris *et al.*,[85] are for non-smokers, a population clearly not reflective of the population of the textile industry where a large percentage of employees smoke and smoke heavily.

In addition, it is manifest that the principle behind the utilization and requirement for periodic pulmonary function testing is the determination of changes, significant changes, in the *individual's* respiratory function. It is not for the purpose of determining whether a textile employee population, as a group, compares favorably to predicted values. Thus, the critical determination which must be made in order to diagnose and treat the individual's condition is one which reflects the *individ-*

ual's change over a period of time. Aside from the obvious logical validity of this position, it is clear that the Act, specifically Section 6(b)(5), requires protection of the employee over his working life.

Finally, the utilization of predicted value for the purposes set forth in the Proposed Standard, specifically the requirement of re-examination every six months, can only result in the rejection of numerous applicants for employment. This result follows because there is little question that, if an applicant has an FEV_1 of less than 79% (curiously the Proposed Standard makes no provision for an employee with an FEV_1 of 80% of predicted value) at the time the *initial* pulmonary function test is administered, and that individual at his first annual examination has *no* change whatsoever, the Standard requires that the individual have a re-examination six months later, plus *the re-administration of the questionnaire.* This result, particularly in view of the fact that a massive number of applicants in the Southeast have an FEV_1 of less than 79% of predicted value, is both incomprehensible and irrational. It can be acceptable to no one.

If any consideration can be given to the predicted values, the utilization of such predicted values must be extremely restricted. Moreover, if predicted values are to be used, then there is no question that they must be adjusted as set forth in Appendix C by 15% for black employees. The evidence of record is overwhelming that there is a difference in lung volume [86] and to fail to take into account such differences, for whatever reason they may occur, would be unconscionable. Such failure can only lead again to rejection of a large number of healthy individuals as the textile industry, as is the case of any employer, does not wish to be placed in the position of reexamining, either by questionnaire or pulmonary function test, employees who show little or no change or dec-

rement in pulmonary function but whose predicted values do not fit in with norms inapplicable to them.

It is no answer to the problem posed by differences in lung function between races to utilize a FEV^1/FVC ratio. This approach, at least as the *sole* method of adjusting for such differences, was rejected for a variety of reasons by virtually all of the various physicians who testified at the Hearing. For example, Dr. Weill regarded it as totally unsatisfactory; Dr. Martin rejected it on the basis it could not be used exclusively; and Dr. Whitworth regarded it as invalid unless there was a limit of acceptance on the FVC itself.[87]

In regard to the criteria to be utilized in connection with the re-examination of employees, it must first be emphasized that the Proposed Standard, once again, adopts a rigid "by the numbers" approach without regard for independent medical judgment or the actual level of the individual's pulmonary function. Moreover, it appears to reflect a presumption or conclusion that byssinosis can be diagnosed *solely* by pulmonary function testing. As pointed out above, such presumption or conclusion is without any support or validity.[88] ATMI submits that the criteria for pulmonary function testing on other than an annual basis must reflect the individual's standardized base-line levels and the change therein.

First, all employees' baseline FEV_1 or FVC, either on initial or any subsequent examination, must be determined by standardized methods with a clear indication of which value will be utilized. In this regard, ATMI suggests that the recommendations of the American Thoracic Society be carefully reviewed and that the Standard indicate that these recommended standards be followed as *guidelines*, if possible. Moreover, it must be emphasized that any standard must specifically set forth which values, be they maximal or mean, which must be considered in comparing any and all pulmonary function

tests.[89] Further, in view of the tremendous variability in the values obtained from day-to-day in an individual's pulmonary function test,[90] in some cases as high as 200 cc's,[91] it should be clearly specified that no test results should be utilized for the determination of re-examination or otherwise unless such tests are replicated. This is particularly true in view of the margin of error built into the various spirometric devices utilized.[92] In this latter regard, it must be noted that in contrast to the too detailed and excessively restrictive requirements of Appendix A in regard to sampling procedures, there are absolutely no procedures set forth in the Proposed Standard which could be utilized as guidelines to attempt to obtain accuracy and minimize the margin or error in pulmonary function equipment.[93] This omission is extremely significant in view of the fact that the variation in "blows" for an individual can be considerable and the determination of the mean values of, for example, FEV_1, should only be made if there are at least three "blows" which show a definite similarity, e.g. a level within 10% of each other.[94]

In regard to the criteria to be utilized in the determination of whether a re-examination of an employee is required on less than an annual basis, ATMI submits that the criteria should be as follows:

1. A decline in baseline FEV_1 totaling 5% greater than the predicted decline or 200 milliliters, whichever is less.
2. A decline in baseline FVC totaling 5% greater than the predicted decline or 200 millileters, whichever is less.
3. A decrement in post-shift FEV_1 of 10% or more or 200 millileters, whichever is less, from pre-shift FEV_1.

In the event the employee meets any of the foregoing criteria, the questionnaire should be administered. In the event that the employee's subjective responses to the questionnaire indicate that the employee may be categorized or classified in one of the acute or reversible grades of "byssinosis," the employee should be issued and required to wear a respirator, without regard to the "cotton dust" levels to which he or she may be exposed.

In the event that the employee, on re-examination during or at the end of a six-month period, which re-examination would not include the administration of another questionnaire, continues to demonstrate a decline or decrement in excess of the criteria set forth above, the employee should be referred to either an outside physician, or physician on the corporate medical staff for an extensive pulmonary examination and clinical evaluation.[95] The ultimate assignment of the employee should be based on the recommendations of such physician.

In regard to the question of transfer of employees to "lower-risk" areas, it must be emphasized that such transfer should be effected only with the employee's agreement and only after consideration is given to a multitude of factors, including age, length of employment in the present area and the extent of decline or decrement in lung function.[96] This approach, utilizing both medical judgment and efforts to minimize the effects of the employee's removal from a familiar environment, also permits a clear determination that the employee's condition is a result of *exposure to conditions over a period of time.* Specifically, exposure to "cotton dust" has resulted in "an accentuated loss of lung function."[97] To do otherwise could require the wholesale movement of a number of employees to low dust areas, an unnecessary disruption of all employees, and a failure to make a clear evaluation that the employee's condition was due to exposure to "cotton dust," not the result of

smoking or some other activity or agent unrelated to occupational exposure. Finally, this approach avoids precipitous action which can only serve to disrupt the individual employee's working place without affording sufficient time to make determinations, such as the effectiveness of the use of a respirator, which may permit such disruption to be avoided.

C. *Physician's Written Opinion and the Furnishing of Information*

Although not extensively treated at the hearing, the provisions of the Proposed Standard relating to these subjects [98] are totally objectionable. ATMI's basic position is set forth in its Objection and Arguments No. 6.[99] It must be emphasized, however, that these provisions, although an apparent attemp to maintain confidentiality, except in relation of occupational exposure to "cotton dust" and resulting pulmonary problems, fail to achieve any objective other than to tie the hands of the examining physician in attemping to treat the employee. This result is apparently caused by OSHA's disregard of, for example, the effects, either causal or addictive, of smoking, clearly non-occupational, in relation to byssinosis and other pulmonary diseases such as chronic bronchitis. These non-occupational causes and effects, assuming they could be set entirely aside from occupational, have considerable relevance, to say the least, in making recommendations regarding the individual. Thus, they cannot, as the Proposed Standard is wont to do, be clearly separated.

Accordingly, these provisions, except to the extent they require advising the employee of the results of the examination, must be deleted.

* * * * *

Dr. Imbus, a physician who has as much experience as any other member of the medical profession regarding medical surveillance programs, particularly in the textile

industry, indicated that a manageable situation under a medical surveillance program "in terms of transferring people" or "reassigning" people would be less than 10%.[160] Thus, even assuming the validity of utilizing the various prevalence studies and without regard to the duration or level of the past exposure, it is clear that less than 10% of the total number of employees covered would be subject to transfer in circumstances in which the cotton trash dust levels, as measured by a vertical elutriator, were less than .5mg/m³ in the processes of opening through roving. Consequently, an unmanageable situation would not be created if the permissible exposure limit for the opening through the roving process was set at .5 mg/m³.

* * * * *

IX. *Conclusion*

In summary, ATMI submits the following:

1. The standard, particularly the permissible exposure limits, should be directed to the prevention of Grade 3 byssinosis or, as the British Standard is evidently directed, the prevention of irreversible symptoms.

2. In view of the extreme variability of the subjective symptoms, particularly Grade 1/2; the unknown causation agent and pathology; and the apparently considerable variation in individual susceptibility to "cotton dust," particularly as indicated by the low level of correlation of prevalence of byssinosis with dust exposure in employees who do not smoke, medical surveillance must be regarded as the primary means of protecting the health of employees exposed to "cotton dust," with engineering controls and work practices considered an adjunct thereto for the purposes of controlling dust levels to a point at which medical surveillance programs are manageable.

3. Although the causation agent of byssinosis is unknown, the definition of "cotton dust" in any standard must accurately and definitively reflect the substance

regulated or the substance which, in this case, at least contains the causative agent. Specifically, the controlled or regulated substance should be "cotton trash dust" or "raw cotton dust." The definition must not and legally cannot include dust from sources which have not been shown to be "toxic materials" or "harmful physical agents."

4. Although the administration of questionnaires and pulmonary function tests should be required as the part of any standard, the standard should not and cannot, in view of the evidence of record, rely on predicted values for determination of the pulmonary function of employees in the Southeast, particularly in the textile industry, and cannot be used in the determination of whether more frequent pulmonary function tests or examinations should be administered. Further, the intervals between administration of the questionnaire except for employees with significant decrements or deficits in pulmonary function, should be considerably greater than the one year period set forth in the Proposed Standard.

5. The permissible exposure limits should be different for different areas of the textile manufacturing process. Specifically, the permissible exposure limits should be the following *mean* cotton trash dust levels: .5mg/m^3 in the processes from opening through roving; .5 mg/m^3 in the yarn production processes of spinning, twisting, winding, spooling and warping; and 1.0 mg/m^3 in the processes of slashing and weaving. Such levels are totally appropriate and reasonable in view of the factors referred to in subparagraph 2 above; the clear reduction in toxic potential of the dust generated by the processing of cotton in the later processes, particularly yarn production and weaving; the various studies which clearly reflect a low or extremely low prevalence in the later processes; the manageablility of the number of employees who may exhibit the symptoms of byssinosis in the face of such permissible exposure limits; and the lack of tech-

nological and economic feasibility in the later processes of yarn production and weaving for achieving, by engineering controls, lower limits.

6. The permissible exposure limits set forth above should not be required by the standard to be achieved by engineering controls in a period of less than seven years, particularly in view of the lack of capacity of the vendors of the dust control equipment required in order to achieve such levels [242] and the enormous capital requirements which such limits impose on an industry whose capacity to raise prices to levels to maintain return on investment is questionable and which is also faced with enormous capital requirements for compliance with other federal standards promulgated by OSHA and other federal agencies.[243]

7. The final standard should not require, as the Proposed Standard does, massive and onerous paperwork, particularly regarding work practices, mechanical ventilation and monitoring, which detract from the ultimate objectives of the standard and which, in compliance situations, have little, if any, value.

8. The final standard should give equal weight to the utilization of engineering control, work practices and the use of respirators, particularly single-use respirators, in regard to achieving the permissible exposure limits. To do otherwise could result in the economic crippling of the entire textile industry, a result not contemplated by the Act, nor in the interest of anyone.

EXHIBIT 171

Letter from F. S. Love to Eula Bingham

July 15, 1977

Ms. Eula Bingham
Assistant Secretary for
Occupational Safety and Health
U.S. Department of Labor
Washington, D.C. 20210

Dear Ms. Bingham:

With further reference to your recent correspondence with ATMI and specifically with reference to our letter to you of July 11, we are pleased to enclose additional information which we hope will be of assistance to OSHA in evaluating the testimony presented by ATMI at the recent OSHA hearing regarding a standard for raw cotton dust. We believe that the information now being submitted is fully responsive to your request as outlined to us in a letter to Mr. Robert P. Timmerman, President of ATMI, dated June 30, 1977, and that it is in accordance with the agreement reached between ATMI attorneys and the office of the solicitor for the Department.

Included in the material being sent you with this letter are copies of all of the individual responses received by ATMI in answer to a questionnaire distributed for the purpose of collecting engineering data. With regard to these individual responses, the following alterations have been made in accordance with our agreement with the solicitor's office:

1. Because their sequence could be used to identify the number of plants in one company, the code numbers originally found at the top of page one have been deleted.

2. Since cotton consumption would be useful to an expert in identifying a given plant, the number of

bales consumed has been deleted in answer to Question No. 1 and a range has been used to indicate less than 10,000 bales ($< 10{,}000$) and more than 10,000 ($> 10{,}000$)

3. For a similar reason, the plant capacity figure in answer to Question No. 2 has been deleted and a range has been substituted for less than 100,000 pounds and more than 100,000 pounds.

4. Again, the speed of cards is also a plant identification factor and a range has been used of less than 30 pounds per hour; between 30 and 60; and more than 60 pounds.

5. The number of spindles provided in answer to Question No. 12 has been deleted and the yarn count has been specified as coarse (0-30); medium (30-50); and fine (above 50).

6. The number of looms provided in Question No. 14 has been deleted.

7. In the relatively few instances in which comments were provided in answer to Question No. 22, these have been deleted because they referred to special circumstances within that plant which might be used by engineers and others to identify the plant.

Regarding the summary of ATMI medical testimony, we are providing the consolidated data which was furnished to ATMI by individual companies and which constituted the basis for such summary testimony. With regard to this information, the following should be noted:

1. The name of the company and the name of the doctor have been deleted.

2. The raw material and the yarn counts have been deleted, with the latter being designated the coarse, medium and fine ranges specified above.

3. Footnotes have been attached for an explanation of accountability.

We are confident that a careful study of the enclosed information will fully and completely substantiate the validity of the ATMI testimony.

We are pleased to have the opportunity of providing it for you and for this purpose.

Yours sincerely,

/s/ F. S. Love
F. S. LOVE
Secretary-Treasurer

mvm

C/ Mr. Robert P. Timmerman

*NO PLANT NAME, COMPANY OR LOCATION SHOULD BE INDICATED

QUESTIONNAIRE TO ATMI MEMBER COMPANIES
TO PROVIDE INFORMATION IN ORDER TO DETERMINE
ECONOMIC IMPACT OF MEETING CURRENT AND PROJECTED
COTTON DUST STANDARDS

PLEASE COMPLETE ONE FORM FOR EACH PLANT LOCATION
(Yarn Manufacturing Facilities and Subsequent Griege Processes)

1. Number of bales of cotton consumed during the 12-month period August 1, 1973 through July 31, 1974 [redacted]. <10,000

2. Please indicate approximately total normal full capacity of plant to nearest 25,000 pounds per week [redacted]. <100,000

3. Yarn processed as a percent of total.

100% Cotton 100 % Avg. Grade 4/3 Avg. Micronaire 3.8

100% Synthetic — %

Cotton/Synthetic Blends — % (% of Cotton in Blends — %)

4. Number of workers employed in: (cotton and cotton blend production only)

3	Opening	78	Spinning	—	Knitting
3	Picking	23	Yarn Prep.	23	Cloth Room
21	Carding	165	Weaving	1	Waste House

5. Opening:

No. of Opening Hoppers 6.

Are Hoppers hand fed from bale lay down? Yes 4 No —

No. of Waste Machines 2.

Total No. of Condensers of all kinds in the room 2.

If automatic feed, are bales placed by hand —, lift truck —?

6. Picking:

No. of Pickers 2.

No. of Hoppers per Picker —.

No. of Beaters per Picker 1.

Total No. of Condensers of all kinds in the room 7.

No of Waste Machines —.

7. How is material moved to cards? Chute fed _____ Lap fed ✓

8. Carding:

Cotton cards:	Number 49	Rate [redacted] 230 lbs. per hr.
Synthetic cards:	Number —	Rate _____ lbs. per hr.
Cotton/Synthetic blend cards:	Number —	Rate _____ lbs. per hr.

9. Drawing:

Breaker Drawing	Yes ✓	No ____	No. of deliveries 10
Finisher Drawing	Yes ✓	No ____	No. of deliveries 6
OM DRAWING	YES ✓		NO. " " 10

10. Roving:

No. of Frames —.

No. with "broken-end collection system" —.

11. Combing:

Yes ✓ No ____ No. of machines 7.

No. of machines with vacuum noil remover —.

12. Spinning:

No. of Frames 95. No. of Spindles [redacted].

No. of Frames with central air return 95

Approximate Average Yarn Count [redacted]. fine

13. Yarn Preparation:

	Yes	No	No. of Machines
B/C Spooling:	✓	—	2
Winding:	—	✓	—
Twisting:	—	✓	—
No. of Twisting Spindles:	—	—	—
Warping:	✓	—	—
No. of Warpers with suction cleaned creel:	—	—	—
No. of Warpers with suction cleaned comb:	—	—	—
Quilling:	—	✓	—
Slasher:	✓	—	1

Sizing: What type used Starch ✓ PVA, etc. ✓

14. Weaving: Yes ✓ No ____ No. of Looms [redacted]

15. Knitting: Yes ____ No ✓ No. of Machines ____

16. Cloth Room: Yes ✓ No ____

No. of Brushers — No. of Shears 1

17. Waste House: No. of Bale Presses 1

Is waste moved to waste house from: Openers - By Hand ✓, Automatically ____, Cards - By Hand ✓, Automatically ____?

Is waste baler filled: By Hand ✓, Automatically ____?

If waste is conveyed to waste house automatically, is it collected in overhead drop tank ____, others ✓?

Operator hours per shift required to bale waste US 5

18. Air Conditioning: (Please indicate type air conditioning used in plant.)

Process Area:	Refrigerated	Evaporative Cooling	Type Filter (identify media where possible) Lint Screen	Self Cleaning or Drum	Additional V-Screen	Roll-up Paper	Electrostat
Opening	✓			TRK			
Picking	✓			"			
Carding	✓			"			
Spinning	✓			"			
Yarn Preparation	✓		TRK				
Weaving	✓	(AIR WASH)					
Knitting							
Cloth Room	✓				TRK		
Waste House	(VENTILATION)		TRK				

19. Air Movement:

Process Area:	No. of Rooms	Supply Air Total CFM	Floor Area Total Sq. Ft.	Ceiling Hgt. Total Ft.	Is air removed from the room thru: Wall Vents	Ceiling Vents	Floor Vents	Machine Orifices
Opening	1	78,000	5,532	20		✓		
Picking	5					✓		
Carding	1	64,000	19,960	20				✓
Spinning	1	177,000	51,800	"			✓	
Yarn Preparation	5							✓
Weaving	1	212,600	65,355	20	✓			
Knitting								
Cloth Room	1	27,500	8,556	20				✓
Waste House	1	10,260	5,250	"	✓			

20. Type Filter Media Employed in Machine Suction Cleaning (machine cleaning systems):

Process Area:	Machine Suction Cleaned		Is Air Returned To:		Type Filter			
	Yes	No	Room	AC	Lint Screen	Drum	Bag	Additional V-Screen
Opening	—	✓	—	—	—	—	—	—
Picking	—	✓	—	—	—	—	—	—
Carding	✓	—	—	✓	—	✓	—	—
Spinning	✓	—	—	✓	—	✓	—	✓
Yarn Preparation	—	—	—	—	—	—	—	✓
Weaving	—	✓	—	—	—	—	—	—
Knitting	—	—	—	—	—	—	—	—
Cloth Room	PARTIAL	—	—	✓	✓	—	—	—
Waste House	—	✓	—	—	—	—	—	—

21. Do you tentatively expect to purchase instrument for the measurement of the amount of air taken into and exhaled from the lungs (FEV_1 and FVC) required under the medical surveillance program for employees exposed to cotton dust? Yes ✓ No ____ Or do you expect to use consultants to perform this type of service? Yes ____ No ✓

Have you already purchased the equipment to measure FEV_1 and FVC? Yes ✓ No ____

In determining cotton dust levels in your work area, do you plan on using in-house capability for the weighing, sampling, etc., or having this service provided by outside consultants? In-House ✓ Outside Consultant ____

22. Additional comments on any questions asked above: ____

*NO PLANT NAME, COMPANY OR LOCATION SHOULD BE INDICATED

III. TRANSCRIPT OF HEARING BEFORE THE AGENCY

PREVIOUS PAGE WAS BLANK

* * * * *

[167]* DR. BOUHUYS: I think perhaps that I should mention that I am a member of Permanent Commission and International Association for Occupational Health, that I serve as Chairman of the subcommittee on Byssinosis on the Permanent Commission.

I have studied byssinosis since 1958, first in Sweden and the Netherlands and, initially it was—I began these studies and I found this story of shortness of breath experienced by people mainly or only on Monday a rather unbelievable story.

At that time I had no experience in the work environment myself. I decided to take a sample of cotton dust to the laboratory from a mill. My colleague, Dr. Lendeim and I held an extract of that dust. We thought that we would prove that nothing happened and that whatever these workers were complaining of had nothing to do with cotton dust.

We were proven wrong in about 20 minutes time. Both of us became very short of breath, had abnormal lung function tests and since that personal experience which I have repeated a number of times since then, I have been fully convinced of the toxic effects of cotton dusts or agents in cotton dust.

These laboratory studies have been extended later with field studies which started in the Netherlands and in Sweden on population groups of cotton mill workers in various types of mills. In 1966 I examined, together with Schelling and Wellborg [168] a group of mostly retired cotton textile workers in the United States. We identified about a dozen people, all men, who were prematurely disabled, meaning that they were or had disabling lung function loss in our judgment and had retired from the work force well before the age of 65.

This study led to field surveys of workers in cotton textile mills in the U. S. where we did lung function

---

* Bracketed numbers refer to the page of the reporter's transcript of proceedings.

PREVIOUS PAGE WAS BLANK

studies before and after work, on Mondays measurements of dust levels in the mills.

These results showed that the acute stages of this disease, byssinosis, consisting of chest tightness and shortness of breath, and a decrease in lung function on Mondays, sometimes also on other days, occurred in some 20 to 30 percent of the carding room workers in different mills and also at variable proportion in spinning and winding workers.

Now, these things are usually stated in the form of answers to questionnaires, numbers obtained at lung function tests. I just want to stress that those things are very important and they provide documentation of what goes on.

I think it is important to stress that I and others who have done similar studies have seen these workers at the end of the work shift, have noticed their labored breathing at the end of a work shift in a work room where there is a risk of byssinosis so there is just no doubt in my mind that there is a serious health hazard here judging from these acute effects.

[169] The work that we did in the epidemiological studies in U.S. cotton textile mills was discussed during the second international conference on byssinosis in 1968 and, together with results from other studies, led to a recommendation by myself and Dr. Gilson, Dr. Schilling that the then existing thresher limit value which was one milligram per cubic meter total dust needed to be revised downward and that a new limit should be placed on respirable but not on total dust.

We also suggested a plan for medical surveillance of cotton textile workers but at this point I would like to say, to a large extent, the proposal is now under consideration, fulfills the kind of needs that we saw at that time, in general and also in many details and I would like to say that I support most of the provisions of the standard and believe that they will contribute, if fully implemented, greatly to improve health of cotton textile workers.

In the meantime, additional studies, elaborate studies in U.S. cotton textile workers were being done since about 1966 or 1967 by Merchant et al and also later by Brown et al. These studies have covered many thousands of active workers and between them by and large confirm that byssinosis was, at that time and still is, highly prevalent disease among cotton textile workers, and, in particular among workers in opening processes, carding and spinning although there are data in one of Merchant's studies on what I consider a significant prevelance [170] of byssinosis among weavers as well as among those in the earlier processing.

Now, there has been considerable discussion about these acute responses to cotton dust exposure. That is chest tightness and other symptoms as well as the acute drop of lung function on Mondays.

One needs to do carefully standardized lung function tests to detect these relatively small decreases of FEV one, for instance, that occur in the course of a work shift on Monday. When one studies a group of workers, one finds a highly significant decrease, even though it may be small, if it occurs systematically in a sufficient number of people.

The medical surveillance requirements of the proposed standard, however, relate to judgments about individuals, not groups. In my comments, I have suggested that the criteria for a meaningful decrease of FEV one might perhaps better be set at an absolute value I have proposed 0.20 liters rather than five percent of the initial value.

This is a slightly less stringent cutoff level, slightly less stringent for all those whose initial FEV one of less than four liters, and I think that such a limit can indeed be detected in the individual if tests are done with care. If there is any doubt, whether we've given personal response to this degree or not it is quite simple to repeat the test procedure on another Monday and find out whether indeed a consistent response.

[171] I believe that provisions in the standard in this respect are good ones and that they indicate the groups

that are most at risk as candidates for regular medical surveillance.

I think that in this way the standard does not impose need for periodical medical surveillance on a large percentage of people whose lung function is normal and who do not react significantly to dust exposures on Mondays.

I would like to emphasize also, although we've heard a lot already today about differences between various studies and studies done by different investigators, in my estimation, the similarities between most of these studies are much more striking than any differences and that, by and large, these studies of byssinosis that have been done all over the world show a very strikingly similar prevalence and actually the dose response relations that are referred to also do not vary to such a degree that it becomes impossible to figure out some reasonable level below which the risk becomes reasonably small.

I believe the standard has chosen a compromise level but I think it's a reasonable choice.

Important to mention too, that most of the reports that talk about differences between various groups of textile workers do not include people in the general population. That is they emphasize differences within the population of textile workers, but because they do not usually include people from, say communities where there are no textile workers, they cannot [172] find out whether there are not great differences between textile workers and others who have never been anywhere near a textile mill.

Apart from prevention of the acute responses on Mondays that have been studied most extensively, the standard is also needed to protect cotton textile workers against an insidious development of chronic lung disease over the years.

The development of chronic lung disease in cotton workers has, of course, been known for about two centuries. I might recall that the first description stems from

England in the 1820s and the 1830s. That exactly 100 years ago the term byssinosis was introduced in a French textbook in public health by Andre Ampust. He was talking about a chronic lung disease although the description was very skimpy at the time.

It is also, of course, well recognized and we describe an example of this 10 years ago, that many textile workers retire prematurely and many of them are obviously disabled before the age of 65. What has not been documented until recently is exactly how important, how many such disabled people and prematurely disabled people there are and it has been very difficult to organize such a study since by definition if one studies working population in mills, one sees those who are able to work and not those who have retired, for whatever reason that may be. And to get more information on the total group at risk, that is those who still work and those who no longer work, we [173] organized in 1973 a community survey, a community based survey where we traced cotton workers who had been employed in cotton mills at a certain defined period in the past, resulting in a population of cotton textile workers who had with few exceptions been employed in cotton textile mills for more than 20 years, an average duration of employment of some 35 years.

We compared the data in this group to data obtained with exactly the same methods in members of community population, at least one community rather close to the textile workers community but a community without significant number of textile workers and we also used data from two communities in Connecticut.

As has been mentioned this morning, these studies have only recently been completed. They have not yet been available. In fact, they are under consideration for publication right now but I am convinced that within the period that the record is open the definitive copy of this paper can be submitted after it has been accepted.

I would like to give my comments or some data that are based upon this study. Perhaps I might mention a few more details. It concerned total number of 675 male and female, white cotton textile workers. The number of blacks in our population was too small to be, we could not analyze that because there were fewer than 10 or so black people in the age group, 45 years and older.

Our control data consisted of a group of 356 males [174] and 662 women of the same age. It is especially important to stress that within the population of cotton workers we had a large group of women, 371, about two thirds of whom had never smoked in all their lives. And I will quote some data especially about this group of women who had never smoked because in studies of byssinosis smoking always comes up as a somewhat confusing factor and that is for a good reason.

The number, yes, we had a total number of 254 non smoking women among the textile workers and as an example, 25 percent gave a history of frequent wheezing, chest tightness. In the control populations, we had 381 such women and only seven percent had a similar degree of wheezing and chest tightness. This was a highly significant difference. The differences were of similar magnitude and all very highly significant for chronic cough as well, for chronic sputum production and for shortness of breath.

We also, of course, looked at the inference of smoking and we compared non-smokers to the smokers, textile workers as well as controls, and, if one does that with a suitable statistical analysis, smoking comes out as a significant variable. But the fact of exposure to textiles, to work in textile mills is a much more significant variable so it becomes immediately clear that if one looks at the significant variables within a population of textile workers then one will find and it has actually been found, that smoking is the next most important [175] variable.

But in comparing the population of textile workers with those who have never been in textile mills with the general population outside the mills, the variable of work in textile mills comes out as the most significant one.

With respect to shortness of breath, I might mention that we found no effective smoking habits on the prevalence of shortness of breath. We found that there the work in textile mills was the only significant variable.

Now, we of course, looked at various categories from textile workers in this population and compared the prevalence of symptoms among them and we found, somewhat to our surprise, that the prevalence both for males and for females, of chronic respiratory symptoms was not significantly different between card room workers, spinning room workers, yarn preparers and weavers. In all these categories, separate or combined, the difference of course, was very highly significant in comparison with the control population.

I might also mention that the prevalence of so-called Monday symptoms of byssinosis in this group and prevalence of other symptoms on return to work after a weekend or holiday, was not particularly high. The highest prevalence was in the male card room workers, 35 percent if one included all symptoms on return to work. It was lower in female card room workers, 18 percent and, similarly lower in the other categories.

[176] Now with respect to lung function, we also made a very careful assessment of lung function both in the control group and in the textile workers.

First of all, we studied approximately 3,000 healthy non-smokers, males and females, blacks and whites, in the control populations in the three communities where there were no textile workers included and on those 3,000 people we based our predicted values.

We analyzed these with respect to age, weight and height. Using that material as a base line then, we could then determine to which extent the cotton textile workers

as well as our community population as whole, that is including the smokers, the people who were at risk of other occupational risks that might exist in some of these communities but which were not cotton textile mills and we could, in this way, compare to which extent the general population in these Connecticut and South Carolina communities differed from a large group of healthy non-smokers and to which extent the specific cotton textile workers differ from the general population and from the healthy non-smokers.

Just to summarize these data, we found both among the males, both among the men and the women, a highly significant increase in lung function loss among the textile workers.

As an example, to quote again, the non-smoking women which are large in number, the forced FEV one in those women [177] was 234, non-smoke life time nonsmoking women, was .246 liters less than that in healthy non-smokers of comparable age, weight and height. And a similar figure for the general population was 0.05, highly significant difference.

This is true for all comparisons between textile workers and controls regardless of smoking habits.

If one looked at smoking textile workers, we found that the added decrement or function in them was just about the same as the added decrement among smokers in the general population so that the effect of textile work and smoking on lung function appeared to be rather simply additive and independent of one another.

Now it is important to mention that this lung function loss was determined in a group of people where the majority were no longer working in the cotton mills so that it is very unlikely that more than a minimum part of this loss could or was due to acute effects of dust exposure in the mill.

Moreover it was our policy to administrate an anti-an airway dynatal drug in all persons who were willing

to take that drug who had a low lung function of certain limits so we made it as sure as we could that we were, in effect, dealing with non-reversible lung function loss.

On the basis of this study and together with the data that have been given in the proposal that we published in the Federal Register we have made an estimate of the total number [178] of disabled people because first we saw a certain number of people in this survey, not a negligible number of people, whose lung function was so low that most specialists would have no difficulty in considering them as disabled people.

For instance, when we took an FEV one level of 1.2 liters as the criteria to indicate disabling lung function loss commonly associated with serious exercise limitation, then we found that in the age group 50 to 69 years, 12 out of the 208 male cotton workers were so disabled, that's 5.8 percent and a similar percentage in the control community was 2 percent. So it was three times higher among cotton worker populations.

We found disabling lung function loss among four men and 26 women who were life long non-smoking cotton textile workers and, of course, there were also smokers and exsmokers with equally severe lung function loss. It appears that the additive effects of textile dust exposure and smoking have mostly the affect to decrease the age at which textile workers become disabled because the disabled smokers were on the average, some five and a half years younger than the disabled non-smokers.

The extimate of the total number of disabled people who might have disabling function loss relating to the workers in the cotton textile industry represents, of course, an extrapolation but I don't think that it's far off and I don't think that our studies over estimate the disability. To the contrary, I think that we rather underestimate it because we found out that [179] a lot of these retired workers had moved away and, of course, we

couldn't see people who were not there. While we were very likely to trace most of the active workers which is, of course, the group biased in favor of the more healthy ones.

So, if anything, I think we have underestimated the prevalence of disabling lung function loss and not overestimated it but of course, still the estimate, of course, one should allow for a healthy margin of error because it does represent an extrapolation.

* * * * *

[244] [Dr. Kilburn:] Secondly, and Dr. Bouhuys emphasized this beautifully, I think, we have the coal miners fallacy. If you have a job that requires a fairly high level of physical activity, as textile work does, whether it is docking, or weaving, or particularly if it is carding or picking, only [245] workers who have a certain level, that is fairly high, of physical capacity, are found in work crews. Thus, if one doesn't study retired, or disabled retired people, one is lead down the primrose path in assuming no disease may be produced, or underestimating the true prevelance of the disease.

* * * * *

[310] [Dr. Weill:] I noticed, I think it was Dr. Kilburn or Dr. Bouhuys yesterday, that in a control mill, explained a low prevelence of Byssinosis of one or two percent as perhaps related to past exposure to cotton dust. I would suggest that a very possible explanation is that there is a certain amount of noise in the questionnaire responses which make it not unreasonable to have some positive responses in a non cotton dust exposed population. The particular mill with the highest prevelance of Byssinosis was a mill that had been studied on a number of occassions before, that is the workers have been studied previously, and they were pretty familiar with the questionnaire and it is possible that they were more aware that symptoms that they had, were in

fact, those symptoms being solicited. The less sophisticated population may not be that aware. It is one of the explanations, perhaps, that should be considered to explain our low prevelance of Byssinosis in the cotton seed process.

* * * * *

[317] In terms of the question of whether or not the biologic response variable that one looks for, what are we trying to prevent. We are trying to prevent bronchial constriction. I strongly favor the prevention of the demonstrated reduction in airflow as measured spirometricly or obtained through the questionnaire responses. Because, ultimately, preventing the bronchial constrictive effect, I think we will probably prevent the chronic disease.

You know there is nothing unique about repeated acute bronchial constriction leading to long term fixed airways obstruction. Chronic effects of Byssinosis are chronic effects that would be equally found had they been studied as well in other industries and in other situations where there has been asthma, and Byssinosis is, I think, really a form of occupational industrial asthma. Ultimately, repeated bronchial constriction leads to fixed airways obstruction. By what mechanism is a complicated subject as Kaye Kilburn mentioned last night.

* * * * *

[334] * * * It is very difficult to standardize and calibrate interviewers so that they are all asking questions in the same way, the same inflection, and so forth.

Our epidemiologists spend a lot of time with that. But still people are different when they ask questions and in interpersonal relationships. In addition to that, the level of education, awareness, sophistication of the interviewee differs markedly from industry to industry and from place to place.

Some of the studies we are doing, the exposed population in general are graduate engineers in a big chemical

installation. Well, their responses to a questionnaire might be somewhat different than a rather poorly educated and very often—I didn't mention this—illiterate population in a cotton seed oil mill, for instance.

The other important variable and no one likes to talk about it, but it is an important one I think; and that is the use of the questionnaire repeatedly and its value after it has been administered for some time in the past.

I think it was mentioned, actually. I think somebody talked about it yesterday as a virginal population, and the population changes when you study them again. Well, they do change. And the second, third, or fourth time, they may change markedly.

[335] I am not impugning motives. I am not suggesting that people are giving false answers. I am just suggesting that there are all sorts of influences that might very seriously affect the results. Now lung function, if it is done properly and all the calibration procedures, the methods of administering the tests are adhered to, I think, is less subject to some of these problems.

* * * * *

[483] [Mr. Held:] I would first like to re-emphasize the desirability of controlling exposures to cotton dusts by means of engineering methods. Respiratory protective devices have many limitations which make them undesirable if engineering controls are at all possible.

Among the limitations of respirators are A, fitting problems with persons with small faces, such as many women, with persons with facial hairs, such as beards or long sideburns, scars or growths which break the face piece to face seal, and with persons with pronounced wrinkling, a sunken nose bridge, deeply cleft chin, very narrow nose, a very wide or very narrow face, or very long or very short face; B, communication problems between workers wearing respirators. Any respirator will muffle voice communications to varying degrees. With many devices, the jaw movement used for speaking can break the face piece to face seal and cause inhalation of

contaminated air; and C, vision problems can be numerous. [484] Downward vision is obstructed with half or full face masks, thus increasing tripping or stumbling possibilities. The inability to look straight down can cause a serious injury. Full face respirators will restrict the wearer to tunnel vision. Persons who must wear perscription glasses must be fitted with special glasses kits for full face masks.

JUDGE FATH: I wonder if you could summarize your statement please?

* * * * *

[485] MR. HELD: Alright. Fine. D, fatigue and reduced efficiency, and E, some people, for reasons of health, would not be permitted to wear a respirator.

* * * * *

[500] MR. FREEMAN: You have testified as to your experience [501] with the workers at Los Alamos, I believe, and the wearing of respirators.

MR. HELD: Los Alamos.

MR. FREEMAN: And other places, the Univeristy of California?

MR. HELD: Yes.

MR. FREEMAN: Right. Are any of those workers required to wear respirators for their full time at work?

MR. HELD: We have had people, both places are primarily engaged in radiation research, and so, if there has been an emergency, a spill, or something, we have already had people 40 hours a week in a respirator, but not all year long, no.

MR. FREEMAN: I see. What is your impression of the ease with which workers handle the problem, or handled the wearing of a respirator for 40 hours a week?

MR. HELD: Well, as I mentioned in the statement, it is not an easy thing to do. We have had frequent work breaks in order to let them, instead of the usual one coffee break in the morning, one in the afternoon, we have

had to increase that frequency to a fifteen minute break every hour or two, and depending on the ambient temperatures under which they were working, and so on.

MR. FREEMAN: Would you have to increase it more frequently for higher elevated temperatures?

[502] MR. HELD: Oh yes.

* * * * *

[540] [Dr. LeSourd:] Engineering controls may be defined as methods designed to collect and remove dust from the air, either by capturing the dust at it's source or through general ventilation and air filtration. It may also include modifications of production equipment and procedures to reduce the dust emissions and substitution of materials to reduce or eliminate toxic components of emitted dust.

We began with the determination of with a feasibility of engineering controls as a means of achieving the desired exposure limits. In general, this is a matter of determining a combination of room ventilation and of local exhaust ventilation as could be applied to the processes involved in each of the industry sectors that were identified as dust sources.

All yarn mills and most other cotton processing establishments except gins, are air conditioned with the air recirculated and supplemented by a limited amount of make up air as needed. Although some filtration is built into any [541] air conditioning system, these systems have not, in the past, been designed to maintain very low dust levels where dust removal efficiency can be enhanced, by the installation of multi-stage filtration systems. But, where the dust sources are substantial, achievement of room dust levels in the range under consideration for this standard, requires the application of low exhaust ventilation as well.

* * * * *

[561] However, the results in this analysis only point out the relative difficulties among size classes of companies and between industry sectors.

Because of the severe data problems, that is the inability to estimate costs for specific companies only in relation to aggregated sales data, where available and the lack of detailed financial data for small companies, our analysis fails to identify specifically which plants will be more likely to close or what proportion of total production capacity will be eliminated due to compliance requirements.

In the course of the study, RTI alerted OSHA to some of the difficulties that the cotton textile industry might encounter in complying with the proposed standard, two factors in particular were identified, the development, production and installation of control equipment by the control industry and second, the ability of textile firms to finance the capital investment required.

Neither of these is completely intractable, given enough time. Estimates of the time required for the cotton [562] textile industry to come into compliance with the proposed standard cannot be made with certainty. A large number of firms are involved and each one will have special conditions constraining its action. Nevertheless, after consultation with textile firms and suppliers of control equipment and consideration of normal business practices and the experience of other industries, RTI suggested that compliance by the yarn producing sector with an exposure limit of 0.2 milligrams per cubic meter, it was estimated would take as much as eight or more years.

For other sectors of the cotton textile industry, RTI estimated that compliance at each exposure level could require two to three years more than for the yarn producers.

The primary basis for these estimates was the problems that the control industry may have in supplying the required equipment. Each installation will tend to be

custom designed for that plant and at best there will be considerable time required to complete and test the installation.

For some equipment, also, entirely new designs will be needed and such new technological applications will not be available immediately, even though the general methods to be used are known.

Financing will also be a problem for many firms. RTI was not able to estimate the extent of this problem since the detailed financial information for each firm is not available.

* * * * *

[594] MR. MOSS: Were you able to quantify the effect and, if so, would you tell us what damage, if any, you would expect the standard implemented to have on our balance of trade.

DR. LEE: No. Because in order to quantify I must have import demand elasticity and beside I could not find appropriate import demand elasticity estimate. That was one factor and another factor was, as I discussed it a few minutes ago, price was not only factor so if I combine those two reasons, one is I could not get appropriate import demand elasticity and I found out in literature survey that price is not only the factor of deterination of import. I could not quantify impact on import.

[595] MR. MOSS: Well how about exports of our textiles produced in the U.S.

DR. LEE: I told you I didn't investigate impact on export in this report. So I did not investigate it.

DR. LESOURD: May I clarify?

JUDGE FATH: Mr. Moss, the witness apparently doesn't have any information on the question of exports. He didn't investigate it and I think he's indicated why he didn't investigate it.

MR. MOSS: Well, now are we clear here that a few minutes ago we were talking about exports of raw cotton in the bale. Now we're talking about cotton textiles.

JUDGE FATH: It wasn't clear to me.

DR. LESOURD: Let me just make a general comment if I may. We did look at export and import problems. We did find that in addition to price, the domestic price of raw cotton or cotton products, there were a number of other factors affecting the international trade, both import and export.

As Dr. Lee has suggested, matters of exchange rate, change, matters of the quotas and tariff rates, the general governmental regulation of imports, agreements on imports, there were such factors affecting the market.

We deemed it inappropriate and probably ineffective to try to project future export flows on the basis of the projected change in price that we had developed in the face [596] of the unknown and frequently more dominant factors affecting both export and import flows. So we confined our analysis to a discussion of the foreign trade issues, the factors affecting it and we did not attempt to quantify the resultant changes and this I think is clearly demonstrated in our basic report in the pages cited by Dr. Lee.

MR. MOSS: Yes, I, on page c-52 I believe you cite the monetary changes since 1971 as examples of price changes that were large enough to affect the trade balance.

Of course, then, our question follows, can you tell us the magnitude of those monetary changes as compared with approximately 18 percent increase you expect the standard to cause in the price of cotton fabrics and yarn.

DR. LEE: We did not quantify in our report about the impact on balance of payment.

MR. MOSS: If the price increase due to compliance with the standard is greater than those monetary changes which have occurred since 1971, would you think that would affect the balance of trade in cotton textiles.

DR. LEE: That argument has little bit shaky ground because those factors are not independent ones. Those factors might be interdependent then we cannot make any kind of priority judgment unless we look at empirical data.

* * * * *

[617] DR. LESOURD: We calculated the incremental cost from an assumed compliance with the 1.0 milligram per cubic meter.

DR. MERCHANT: Of total dust.

DR. LESOURD: Yeah.

DR. MERCHANT: And that was across the industry.

DR. LESOURD: All costs—

DR. MERCHANT: All costs.

DR. LESOURD—were presented as incremental, yes, in that sense.

DR. MERCHANT: Did you take into account data which I was presented. I'm not sure if you were here for Dr. Kilburn's presentation but it was a part of his package which showed that substantial proportions of the industry are, in fact, within compliance of what the proposed standards is, that is two tenths of a milligram, vertical elutriator dust.

DR. LESOURD: We didn't have data on the degree of compliance currently in the industry.

DR. MERCHANT: You did not seek to apply any of the data that had been collected in the industry to try to take this into account.

DR. LESOURD: I don't think, from my memory of what we had, that we felt that we had available data that indicated the degree of compliance for the industry.

There had been studies of specific mills. There had [618] been studies of dust levels in specific operations but I don't believe that we had available to us data which would indicate the percentage cards that were controlled to a particular level or similar data for any other process or industry sectors.

DR. MERCANT: So let me make sure that I understand this clearly. You assumed across the board for all processes that you costed that they were all at the compliance level of one milligram per cubic meter of cotton dust, total cotton dust, regardless of whether it was a cotton mill or synthetic cotton mill. Is this correct.

DR. LESOURD: Yes.

DR. MERCHANT: Or whether it's a yarn mill or weaving mill.

DR. LESOURD: Let me confer with Mr. Wright. Mr. Wright points out to me that what we were doing was costing so that we calculated a difference in cost for the levels of compliance. We really didn't make any assumption or determination of the number of plants that were in compliance nor did we assume that everyone was in compliance. We merely calculated an incremental cost to increase controls from 1.0 milligrams per cubic meter total dust to .5, .2 and .1 milligrams per cubic meter of elutriator dust which is an incremental calculation without any real knowledge of what the degree of compliance was.

DR. MERCHANT: But, if I understand what you're saying, [619] you're saying that across the board you started at one milligram regardless of the operation and costed what it would take to go from one milligram to five tenths, two tenths or one tenth. Is that correct.

DR. LESOURD: Yes. We calculated the incremental cost.

DR. MERCHANT: So is that, in fact, not an assumption that the industry is at one milligram?

DR. LESOURD: No, I think we were aware that the degree of control varied from plant to plant and we were, it was our understanding that we were to estimate the cost of this standard, costs attributable to this proposed standards would not include costs attributable to the achievement of previous regulations. Therefore, one is excluded from the other and we have an incremental cost.

DR. MERCHANT: Right. Now, let me put this question to you. If a portion of the industry is, in fact, currently at two tenths, is it reasonable to you that they should be included in this analysis. This is a hypothetical.

DR. LESOURD: I don't quite know how to answer that. If we had data that clearly indicated the amount of expenditures that had been undertaken to accomplish specific dust levels in specified portions of the industry, then we might want to look at this, but we didn't have such data so we didn't.

DR. MERCHANT: If you were provided with such data [620] that I think has been submitted from both OSHA witnesses and also in submissions from the industry would you be able to recalculate these sorts of estimates.

DR. LESOURD: I don't know without examining the data in detail and considering the procedures that would be necessary, I really couldn't answer that.

DR. MERCHANT: Do you think it would be reasonable to look at that data.

DR. LESOURD: I don't know what you mean by reasonable. Yes, out of my own curiosity I probably will look at the data that's submitted in this hearing but do you mean, I'm not sure what you mean beyond that.

* * * * *

[646] DR. LESOURD: Let me answer this way, if I may. And I don't mean to be unresponsive. Only to say, that we don't claim that these costs are a precise—that our cost estimates are precise measure of the costs which would be necessary to achieve the control levels stipulated. They are estimates, approximations. They are based on average conditions, on general conditions. They are intended to give a reasonable reflection of the level cost involved. But, do not claim to be precise. Partly because there are a number of costs involved in which may vary from plant to plant, depending on what each plant has in place, the space that is has available, the

peculiar problems that may be related to installation of new equipment, within that plant, which would effect its cost.

This being the case, we have presented only [647] measures to indicate the magnitude of expected cost. Approximate level that may be expected and the costs, other estimates of costs may well differ, depending on more detailed knowledge of the exact equipment in place and the requirements on a mill by mill basis.

So that, we don't intend really to defend these costs as being precise and exactly what would be required.

* * * * *

[813] [Dr. El Batawi:] So if I go back in retrospect and look at my earlier papers of the 60s, of the early 60s, I would then exclude grade half and call it dust reaction, I would call byssinosis only grade one and then I would say that the cotton dust mainly has three types of effects. The acute effect which could be irritation of upper respiratory tracts and the bronchi and that is the reaction to dust at the early stages, then the byssinosis which is the [814] typical tightness at the beginning of the week or following return from holidays and then the third type reaction or effect is the chronic obstructive lung disease with its different stages.

* * * * *

[838] MR. GREENE: Could you explain why you think the people [839] worked there the longest had the higher grades of byssinosis.

DR. EL BATAWI: Well the explanation we gave is that the repeated insults on annual basis to the reserve capacity of the lungs eventually leads to damage of the respiratory tract.

MR. GREENE: You mean in the six months off these people did not toally recover.

DR. EL BATAWI: Well they could recover, definitely as soon as you remove them from exposure to dust, don't

get byssinosis. You only get byssinosis when you are exposed to it first day of the week but in the first year after six months of exposure he might come out with little derangement in the upper respiratory tract and keep coughing for two or three months afterwards. The second year a longer period of time, the third year more and so on until there comes a time when the condition is actually chronic bronchitis and leading to disability.

MR. GREENE: So then the six months off does not make a person "as good as new". Is the person exactly the same in terms of his lung, his pulmonary function or abilities after he's—

DR. EL BATAWI: Are you a doctor.

MR. GREENE: No, excuse me, I'm not.

DR. EL BATAWI: Well it is known in all occupational medicine if you have a certain degree of exposure and a biological [840] reaction to it you interrupt exposure, this biological reaction gradually disappears and then some regeneration occurs. If you repeat the insult again, the ability to combat that harmful agent is already lower down by the previous exposure and the duration of time to regenerate after interruption of exposure will be longer and there comes a time when during the season when they are not exposed to dust they still cough.

MR. GREENE: Maybe then what was confusing me was this term reversible. By reversible I just thought that means as a layman, that it would go away completely again. How would you define this word reversible in terms of this byssinosis.

DR. EL BATAWI: Reversible means, in the early detection of health impairment definition you mean.

MR. GREENE: Or any way.

DR. EL BATAWI: Health impairment, there is always an effect happening to any kind of exposure but that effect may not be harmful and in occupational exposure to different things, let's say the cotton or the flax

or whatever, the preliminary effects is a violent reaction by selia and mucuus membrane and so on. And then irritation to these. There can be other things like micro-organisms, doing something to the microfacts of the lung and so on. It can be other things like histomenic operation of the muscles and the muscles are secreting histomene and there is the effect of that. So at one stage of one, in the early stages, you have certain changes when you [841] suspend exposure they are reversed completely. The person becomes normal. But then if you repeat the exposure again, his ability to combat that is most probably less than when he was originally normal to begin with.

* * * * *

[1000] DR. MERCHANT: Before I get started it may be useful to just review my professional background. I graduated from medical school at the University of Iowa in 1966, had training in internal medicine at the Cleveland Metropolitan Hospital from 1966 through '68, joined the Public Health Service in 1968, was assigned to the North Carolina State Board of Health, where I worked with John Lumsden in the Occupational Health Section.

It was at that time that we got involved in our studies in the cotton textile industry. In 1970 I took a fellowship in environmental and pulmonary medicine at Duke University and at the same time was a student in the Graduate School, School of Public Health, Department of Epidemiology, in Chapel Hill. I finished my clinical training [1001] in 1973 and in 1973 I was also awarded the Doctoral Degree in Epidemiology.

At that time I joined the faculty of the Department of Medicine, Department of Epidemiology at the University of North Carolina. I shortly thereafter was awarded a Trudeau Fellowship to study at the University of London for a year and I was associated with the Cardiothorasic Institute in the Bromton (?) Hospital in London from 1973 to 1974. At that time I returned to

the University of North Carolina for about a year at which time I took the position as the Director of the Appalachian Laboratory for Occupational Safety and Health in Morgantown.

This laboratory has as one of its primary responsibilities the function of doing research for NIOSH in the areas of occupational respiratory disease.

My comments on comments on cotton dust are based on my personal experience dating back to 1968 and in that time I have looked at textile workers and textile processes extensively in the United States, in Africa, in Great Britian, in Ireland. My comments were based upon interviews with approximately 3 to 4 thousand textile workers and the observations we made have been reviewed in the submissions that NIOSH has given for this hearing.

* * * * *

[1002] DR. MERCHANT: This is some work that Schilling did and it is looking at the reliability of the diagnosis of byssinosis and in this particular study they looked at 183 cotton mill workers and two observers interviewed the subjects over a period of months. As you can see, the complete reproducability was 76 percent as to whether they had no evidence of byssinsosis, whether they had grade one which is chest tightness every Monday, or grade two, chest tightness on Monday and other workdays.

If you look at whether the workers was considered to have byssinosis or not, the agreement was better, it was 93 percent. I believe even after discussions they found that they could not agree on whether workers did have byssinosis or not in six of these 183 workers.

Schilling followed this up with some work looking [1003] at maximum voluntary ventilation, this is a slide that Kaye Kilburn showed. This shows the differences in the maximum voluntary ventilation which was calculated indirectly looking at FEV .75, to this was essentially looking at an FEV .75, very similar to FEV 1's that we will be talking about in a bit.

It shows the separation of the byssinosis grade 1, byssinosis grade 2, from the normal cotton workers and the health controls who did not work in cotton mills but who worked in a light engineering work where they had no substantial exposure to dust.

Notice the reflection at the bottom of the byssinosis grade 2, there were a number of workers who had been compensated for byssinosis who were dropped out, and their flow rates continued to go on down. So this is evidence of selection of affected workers out of the industry which is a very important phenomenon that is observed and has been observed repeatedly by nearly everybody who has looked at byssinosis in these vegetable and textile dusts.

When we started the process of doing our studies in 1968, we had a questionnaire which Peter Schrag had used in a previous study. We were not at all sure about the questionnaire diagnosis of byssinosis. We did use a questionnaire which I think Dr. Kilburn mentioned, talked about. We developed a byssinosis index. We did not use this to diagnose people as byssinotic or non-byssinotic, as has been suggested in some of [1004] the comments here at the hearing. We instead interviewed all of the workers and made a position diagnosis. We did have a byssinosis index in that particular study, and we made some observations.

This material was subsequently published in the *Annals of Internal Medicine*. It showed the effect of dust, it showed the effect of smoking, it suggested there was interaction between smoking and dust. This was a crude byssinosis index which was arbitrary and was not based upon any standard questions.

In 1969, I went to Great Britain and went to see Richard Schilling, and sat down and talked to him about the questionnaire. He gave me a copy of the questionnaire that had been used in Great Britain. It is a much more extensive questionnaire and was subsequently adopted by BOSH in their proposed standard.

We followed this questionnaire very closely. We used all of the questions for the diagnosis of byssinosis. We added one item to the chest tightness question and that concerned whether workers had chest tightness after a week or ten days away from the mill. Our experience in the earlier survey had convinced us in our clinical examination that this was an important question, and I would agree with those who comment on it that this is an important question and often workers will give you a very clear cut history of byssinosis after they come back from a holiday. Whereas, they may not [1005] otherwise. So this was a modification. But other than that, the questions used in the earlier studies in Great Britain, particularly those of Molyneaux and Tombinson were the same.

Using this questionnaire we wanted to test the reliability of it in our own hands and so we did this exercise with a number of us participating. We had two chest physicians, Dr. Kilburn and Dr. Harris, interviewing patients independently of the questionnaire which was given at a different time. And then we had a very abbreviated questionnaire which consisted of just a couple of questions having to do with chest tightness.

I do not want to confuse anybody by suggesting that we are making a diagnosis of byssinosis on the basis of pulmonary function data because the diagnosis of byssinosis can only be made by the characteristic symptomatology. This is a point that Dr. Taylor will comment on when I am finished.

We did find a substantial degree of agreement between the standard questionnaire that Schilling had provided us, the chest physicians who were interviewing patients independently using any questions and means that they felt they should. And then this very abbreviated questionnaire. I think you see the degree of correlation between these various methods.

We felt after that that the questionnaire was an instrument that we felt was reliable and reproducible, we

felt was particularly reproducible in those who had Monday chest tightness every Monday, the grade 1 and the grade 2. There is [1006] more variability in the grade 1 half workers because their symptoms tend to be intermittent. In our experience this is less reproducible and I think most people have found this.

We looked at the validity of this. We looked at flow rates over a week, and again this is a slide that Dr. Kilburn showed. It shows the different in physiological pattern between asymptomatic workers, those in this case who had byssinosis, grade ½, and those who had byssinosis grade 2, we had no byssinosis grade 1 subjects in this particular study.

This pattern has been studied by Gandidi, it has been studied by those who did the work, by Carey and Elwood in Ireland. Everybody shows a similar type of pattern. There appears to be a different pattern for different grades. The workers who have grade 2 have a very clear cut and prominent drops throughout the workweek; whereas those with grade 1 tend to level out in the middle of the work week.

Now the objectives of the study that we developed dose response data from was to look at byssinosis prevalence in all primary textile mill processes over the wide gradient of dust exposure. We realized at that time that we had no opportunity of doing a truly representative study of the entire textile industry.

We did have an opportunity to look at Burlington Mills in North Carolina. We were limited to North Carolina [1007] because the North Carolina State Board of Health was one of the principal supporters and participants in this study. Within that population we selected 8 mills out of 22 that we looked at. We were looking at a number of different processes. What are aim was was to get a wide gradient of dust exposures. We realized from the outset, and we made a conscious decision that this was not a representative sample of the entire industry.

We did not have the opportunity to do that. Even if we had done a representative sample of Burlington Mills in North Carolina, we had reason to thing that this was not representative of the cotton textile industry either.

We are interested beyond looking at byssinosis prevalence in different processes, in looking at dust levels, in looking at response over dust levels, and we were interested in identifying individual workmen, making recommendations for their management, and we were very interested in looking at determinants of respiratory disease.

This was really the thing that was the primary criteria for the selection of mills and for filling in the design matrix that had been developed by Dr. O'Fallen to look at risk factors and respiratory disease among cotton textile workers.

So there were several objectives. I think we met these objectives fairly well through the results we obtained.

* * * * *

[1012] DR. MERCHANT: The other thing we looked at was pulmonary function. This is age and height adjusted, FEV 1, over a work shift. This is the change in FEV 1 in cc's. We are looking at the same categories by smoking status; those who never smoked, moderate-heavy smokers, former smokers. We see that the synthetic and wool workers there is really no consistent change up or down. Below 1/10 it is the same thing. At 1/10 to 2/10 we start seeing significant drops, particularly in those who were smokers, not in those who had never smoked. [1013] At 2/10 to 4/10 we see more consistent drop, and then we see bigger drops up above 5/10. So we are tending to see a lot of internal consistency between our histories of byssinosis, histories of bronchitis, and drops in flow rates by dust level and by smoking status.

(Slide)

DR. MERCHANT: Now this is a figure that Dr. Kilburn showed, and I think some questions have been raised about means and medians. I think it is worth putting up again. We made a very conscious decision to pick medians. We felt that this reduced the outliar effect which introduced a lot of variability. We did not know how much of this might have been spurious, how much of it was real. At any rate, we picked the median distribution.

You see here looking at byssinosis prevalence, all grades regressed against dust levels by the three measures of central tendency. You see the median and the geometric mean running very closely together. They are highly correlated, byssinosis prevalence is highly correlated with dust levels.

You see the mean distribution is shifted over to the right. It tends to cross down at about 2/10, between 1/10 and 2/10, so they appear to be quite close down below 2/10. One gets up to about 5/10. The prevalence would be expected to be lower with the mean dust level. This is something that I think has been raised in the past. This has not, I think, been adequately [1014] recognized that there are, particularly as you get higher dust levels, there would be, in our data at any rate, expected to be such changes in byssinosis prevalence if you are talking about the mean exposure or whether you are talking about the median exposure.

Down at lower levels it appears not to be an important factor.

(Slide)

DR. MERCHANT: Now these are dose response curves which shows the standard regression analyses on the top. This is group 3. These are all workers in the preparation and yarn areas in the cotton and blend mills. We are correlating byssinosis prevalence to median dust levels. Superimposed is the probe and analysis

which is done by Ken Bush, looking at this same data. It was observed that the model fits the data very well in all instances and given us a good testing. There was very little difference between what was predicted by the probe and what was actually observed at dust levels particularly below 5/10.

We felt the points out above 1 milligram did represent selection and we eliminated that from the linear regression. However, these were taken into account in the probe. So we looked at it both ways. I think there is good evidence that there is selection from high risk dust areas and I will show you some data on that in a minute. [1015] The median dust level correlation for slashing and weaving is different. This, we feel, is due to the introduction of sizing which is respirable in size. We saw in the three mills that we looked at a distinctly different dose response curve for the people working in slashing and weaving compared to those working in preparation and yarn areas.

Again, there is a striking linear association between the two. I would say that we looked at the differences between workers in the preparation yarn areas, we looked at the effect of whether it was a blend mill or primary cotton mill, and we did not observe any differences in those responses.

The vast majority of the exposures below 5/10 were observed in yarn areas of cotton mills.

(Slide)

DR. MERCHANT: Now this is looking at the same data. The top regression is looking at all grades again. We looked at just grade 1 and grade 2, which is the second curve, and then the bottom curve is just looking at grade 2. You see the linear associations are maintained after high degree in all instances and you see the effect of the different grades of byssinosis here still at 1/10. It is suggesting that one would observe, and in

fact we did observe, byssinosis at all grades, even down to the 1/10 and 2/10 level.

(Slide)

DR. MERCHANT: Now Frank Mackinson said something about [1016] wash cotton. We did a number of studies looking at wash and steam cotton. We looked at wash cottons three times; one bale of cotton was prepared commercially and was donated for the study, the other two bales were washed by Burlington Industries, these were thoroughly washed bales of cotton, but just water washed with a wetting agent. This was the only thing that was added. When these were run, we consistently saw no detriment in flow rates, in fact, they tended to go up somewhat but that was insignificant. We saw dust levels reduced from about .75, they were reduced down below 1/10. We had very little symtomatology. I think we had one worker who complained of a cough during these trials but very little symptomatology so we feel that washing cotton can effectively, if it is washed thoroughly, can effectively eliminate the biological effects, both the physiological effect and the symptomatology. Of course, this is highly correlated with reduction in respirable dust.

(Slide)

DR. MERCHANT: I wanted to show some other—I guess we have gotten a bit out of order—but I wanted to show some other response data that I reviewed and some of the material that we submitted. This is data from Molyneau and Barrie, which was presented at International Conference on Byssinosis at Alicante in 1968. They are looking at medium dust. This is dust that is collected with the horizontal elutriator with a [1017] 2 millimeter screen. They are taking everything that comes through the 2 millimeter screen. That is what they calling medium dust. The byssinosis prevalence was

obtained from a questionnaire which was very similar to ours. The same questionnaire that Schilling gave me.

The correlation here, 1 c, is relatively good. The ring spinners they excluded from this analysis. But I think there is reason. These ring spinners, I think, represent a group of 108. One of the points they make is the accumulation of lint on the 2 millimeter screen in linty areas can serve as a secondary filter. So I think the validity of the medium dust levels in areas where there is a lot of lint such as ring spinning is open to question. In fact, I have talked to Barrie about this very problem.

They are seeing byssinosis prevalence very similar to ours, even with differences in dust sampling techniques. They cannot be strictly compared but obviously the respirable dust, or the fine dust, or the dust that is inhaled into the lungs would be included in the fraction below 2 millimeters.

(Slide)

DR. MERCHANT: This is looking at byssinosis in speed frame tinters and people who work in the roving area. In this country again you see a very good relationship between byssinosis prevalence and medium dust. Again, the figures are not that different from the observations we made in this country, even [1018] with differences in dust sampling techniques and the methods used.

* * * * *

[1019] DR. MERCHANT: Now question has been raised about previous exposure and the effect that it may have on the diagnosis of byssinosis or on the occurrence of byssinosis. In the model cardroom experiments we did, we identified a panel of reactors. These were 12 people, some had typical symptoms of byssinosis, others had only flow rate changes. At any rate, we studied these men extensively and we found that by

varying dust level we could affect the proportion with chest tightness. And if the respirable dust level got up to, as it did on one occasion, up above 1.2 to 1.3 milligrams per cubic meter—this was respirable dust collected by a large cyclone the areodynamic diameter of which was approximately 10 microns below. It was somewhat different that the vertical elutriator dust that we collected. But when we got up to that level, we found that nearly all of these men would become symptomatic.

Similarly, we reduced the dust levels, the symptoms would proportionately come down. One sees that this is a highly linear response that one observes. I show this slide just to show the raw cotton dust exposures. We were also looking at steamed cotton. In this we found that the dose response for steamed cotton appeared to be somewhat different but, as Frank mentioned, this was not borne out by intervention studies.

This observation, plus the next slide which we [1020] essentially showed the same thing, that flow rates were affected in this panel by changing the dust level.

(Slide)

DR. MERCHANT: This was the linear response to the same workers. It would increase or would decrease, depending upon the level of dust. This together with the observation in our study, the duration of cotton dust exposure was not a significant variable. It leads us to conclude that the prevalence of diagnosis or prevalence of byssinosis is related very largely to current dust levels, as are changes in flow rates.

(Slide)

DR. MERCHANT: Now this is a slide that I would just like to show you, showing some of the internal consistencies in dust sampling. This was part of the steaming intervention study that we did. And although we saw some reduction in the opening blending and picking,

which are the open bars on the left, over a number of different sampling periods that make a total of ten different times that we studied this particular mill, you see in the carding and in the areas of yarn processing, spinning, winding, and twisting, that the dust levels were very consistent except at the end where we saw some increase in dust levels which we feel may be responsible —or that the steaming may be responsible for these increases in the later dust levels put up but a high level of correlation. I think this has been observed by others who will testify at this hearing.

* * * * *

[1025] DR. TAYLOR: Your Honor, I am Jeffrey Taylor. I am Associate Director of Appalachian Laboratory for Occupational Safety and Health. I was educated in England, in Manchester. I graduated from medical school in 1952. After doing clinical training, went into pathology for four years. I then moved to immunology and I have been an immunologist since that time.

During the 1960's and early 1970's I have been involved in studies into the mechanisms of byssinosis. As many of you will know, the literature on byssinosis is very extensive and is littered with the fallen hypothesis as to the causation of this disease.

There are two major difficulties in understanding the causation of byssinosis; one relates to the worker himself, and the other to the cotton dust. Whenever a group of individuals interested in byssinosis get together, one of the major bones of contention is what do we mean by this term. From the worker's viewpoint, it is a sensation of chest tightness, which comes on several hours after working in a dusty cotton environment. It tends to become worse during the working day. And in the evening he finds it difficult to undergo normal activities, he finds it difficult to walk rapidly home, and tends to do very little.

This may occur only on Mondays, or it may occur on Mondays and other days of the week. From the physiologists' viewpoint, it is a decrement in respiratory function which takes place sometime after exposure to dust. These two views of [1026] byssinosis, the worker and the physiologist, do not agree entirely.

In large surveys there will be approximately the same number of people who show symptoms as shown decrements in function, but they will not be entirely the same people. There will be an overlap in that many people with symptoms will show decrement of functions, but equally there will be people with symptoms with no decrements of functions, and there will be people with decrements of function with no symptoms.

Indeed, normal individuals who have never entered the textile industry at all, will often show decrements of function equally as great as individuals with byssinosis. This has caused considerable confusion.

* * * * *

[1032] [Dr. Merchant:] Clearly no inference from our study can be drawn as to the prevalence of byssinosis in the entire U.S. textile industry, but no study has been done, either here or abroad, that could do that properly.

* * * * *

[1038] MS. SIMMONS: Dr. Merchant, do you feel that it is [1039] possible through a rigid medical surveillance program, such as the one proposed, to identify all reactors at an early stage?

DR. MERCHANT: Well, I think that is a very difficult question. I gather you are talking about this question in the context of the U.S. textile industry doing this?

MS. SIMMONS: Yes.

DR. MERCHANT: I feel that reactors can be identified. I am not confident that everybody who is having Monday chest tightness or having drops in FEV that

they are the only people who are being affected by cotton dust. I think it is very possible that you may have people you would identify for a variety of reasons. I think one of the major problems in identifying people who are symptomatic is that workers will very often deny their symptoms, particularly if they are worried about their employment. People generally deny symptoms anyway. Patients deny symptoms. I think this is a big problem in this industry. And I think, as Dr. Taylor testified, we know that people who give very typical histories of byssinosis will not necessarily show physiological effects. So I do not think that one could rely 100% upon physiology.

Another point is we have heard the textile industry is fragmented, there are a number of small plants. The ability of all manufactures to implement a high quality medical surveillance program, I think, is a problem. I think some surveillance program is necessary and certainly we should attempt to do as [1040] good a job as possible, but I would be very reluctant to place a lot of reliance on medical surveillance. I think the maximum reliance should be placed upon the environmental control of dust.

MS. SIMMONS: Dr. Merchant, even considering all of the different processes within the textile industry and the different grades of cotton that are being processed within different mills or within one mill, do you find, both in your own data and in other data that you have reviewed, a similarity in the dose response found by yourself and other investigators?

DR. MERCHANT: Well, we found a high degree of correlation with the data that Molyneux and Barre have reported. I think there are a number of difficulties in comparing data because the dose response data that has been collected in Great Britian has all been collected with a different sampling method. So as I pointed out in the slides I showed, the comparisons cannot be exact.

I think the important thing is that in the major study that has been done, the prevalence levels of disease at low dust levels, fine dust levels, or respirable dust levels, depending on how they defined it, were not dissimilar to ours and were in an area of low dust levels.

There obviously are some differences. There is another study done by Fox which shows a different dose response relationship which disagrees with the study done and reported by Barre and Molyneux. But I think the data that we have [1041] selected largely agrees with the British data, and in fact we were somewhat surprised when we were done how closely they did agree. I think the proposed rules make the point that there are wide disparities between studies. I think it is remarkable once dust concentrations and different processes are taken into account, even with the different methods used, different countries, slight differences in questionnaire, how similar the prevalence levels are from country to country and process to process.

So I think there is a good degree of correlation between the investigations. There are certainly some individual differences.

MS. SIMMONS: Dr. Merchant, did you in your studies adjust for the past use of the medical questionnaire on your population?

DR. MERCHANT: In the population we looked at the workers had not been surveyed in the past. This, I think, may be an important factor. How important it is, I do not know. One of the critical things in our survey is that we pointed out to the workers that this was an independent study that was being done. We found that we had excellent cooperation from the workers, from Burlington Industries. We had a high degree of participation. We felt that the workers were forthright, generally, although we found several instances of denial. I think this is a phenomena which is relatively common in this [1042] situation as in all medicine. These people

had not been previously surveyed so this was not a factor in our study.

MS. SIMMONS: Did you take into account, or do you feel it is important to take into account, the present effect of past exposure under differing circumstances in studying a mill population?

DR. MERCHANT: Well, in a cross sectional study, this is one of the limitations of this study. One does not know, over time, exactly what the dust concentrations have been. It is one of the reasons the mills we picked, we picked to be mills where the process had been stable, where the machinery in place had been stable and had not been changed recently, that the population was relatively stable. So we felt we could minimize the major differences in dust level in the past.

In following some of these mills relatively closely, we find that the dust levels are relatively constant and the raw products that go in and the products that they are using, and the machinery and the exhaust ventilation systems are not changed in any major way. I think there will be testimony to that point later on. So I think the dust levels are essentially the same.

I would like to point out that in our study we did not find that duration of cotton dust exposure was a significant or important variable. I pointed out on a couple of other slides [1043] that we, by changing dust concentration, could effect the symptomatology and the changes in flow rate. So I feel that the dust level at the time the survey was done or within the few weeks or months before the survey are the important things in terms of determining byssinosis prevalence.

* * * * *

[1136] MR. THOMPSON: Do you have an opinion as to how long it takes to develop the symptoms associated with those grades one half to two, historical byssinosis and specifically to reach grade two level.

DR. MERCHANT: Well, I think that's a highly variable depending, it's on the individual. We certainly observed people within four years of employment who would develop typical symptoms of byssinosis and others took longer to develop this but we observed a substantial proportion within four years developed and gave us typical histories of chest tightness on Monday.

MR. THOMPSON: Would a competent medical surveillance program identify such a person long before he reaches this level.

DR. MERCHANT: Before he reaches which level.

MR. THOMPSON: Level two.

DR. MERCHANT: Level two.

MR. THOMPSON: Yes sir.

DR. MERCHANT: What do you mean by that.

MR. THOMPSON: I think you know what I mean by competent [1137] medical surveillance program.

DR. MERCHANT: Well, I think it depends, grade two depends upon the worker giving the characteristic history. If the worker, for any reason, should deny that history which, as I testified earlier, is not an uncommon phenomenon and I think could happen more often when people who are not from outside organizations are asking the questions. Then I think it's possible that one could miss true grade two byssinotics with a medical program that is competent, is professional, well run and I think it's still very possible that these people would not be identified because they would refuse to divulge symptomology for whatever reason.

MR. THOMPSON: Do you agree that medical surveillance is a vital factor in identifying those people who may be reactors to cotton dust.

DR. MERCHANT: I think medical surveillance programs are important and should be an integral part of the standard but I feel that this is a secondary importance to dust control and, as I said earlier, I would not want to have to pay a lot of reliance, put a lot of

reliance on medical surveillance in terms of dealing with the problem of respiratory disease in the cotton industry. I'm just not sure how effectively it could be accomplished.

MR. THOMPSON: Do you recognize that there are some people who are more susceptible of getting byssinosis than others.

[1138] DR. MERCHANT: Indeed there are. I would agree with that.

MR. THOMPSON: Do you recognize and would you agree that some of those people can be identified at the very beginning stage of their employment.

DR. MERCHANT: Yes, I believe some of the people can be identified early on.

MR. THOMPSON: Would you agree that if a medical surveillance program is in effect that more of those people would be identified than if a medical surveillance program were not in effect.

DR. MERCHANT: Obviously, if one does not look you will not find these people.

MR. THOMPSON: You agree then don't you.

DR. MERCHANT: I would agree, yes.

MR. THOMPSON: Would you then agree that with a medical surveillance program that meets your description of competence as a medical doctor, that you would have a better opportunity of removing those persons who are susceptible of byssinosis early in the game than you would if you did not have such a program.

DR. MERCHANT: Well, I think identifying people and removing them are perhaps two quite different things. In regard to the recommendations made as a result of an examination and the reaction of the worker to that. I'm more confident that one could identify people that were having reaction to the dust than [1139] I am that you will be successful in relocating these people. This is again, in my opinion, for a variety of reasons.

MR. THOMPSON: I didn't understand you, sir.

DR. MERCHANT: I said I believe it would be, you're more likely to identify reactors or byssinotics through use of questionnaires and physiological tests than you are to successfully relocate those same people within the mill.

MR. THOMPSON: Why is that.

DR. MERCHANT: Well, I think there's a number of reasons. If you have a significant proportion of your people affected there may not be adequate jobs at low dust levels, say below two tenths of a milligram or below one tenth of a milligram where you could place these people.

There is reluctance very often among the employee himself to leave his job. I think clearly some guarantees as to wages and opportunities must be an integral part of any recommendation to relocate somebody and it has been the experience in coal mining where miners are allowed, under the Coal Mine Health and Safety Act of 1968, to be transferred, a very low proportion of these men actually exercise their transfer rights.

So this is a very real problem with surveillance systems. You can have a very competent highly motivated medical surveillance team. You can identify the workers and then you may find the workers are very reluctant to give up their jobs for whatever reasons. Very often they fear that they're not going [1140] to be paid as much. They will not have the same opportunities. Problems of seniority. All of these things come into it. The only experience that I know of in this regard in this country has been in the coal mines where we find that fewer than 10 percent of these men will actually transfer even though they're given the right to transfer to low dust areas by law.

* * * * *

[1325] MR. FRUMIN: Okay. On the top of page 17, you make the statement, "NIOSH does not recommend

continual respirator use. This is touching on the same subject.

DR. BAIER: It's an extension really of what I was just talking about.

MR. FRUMIN: When you say continual,—

DR. BAIER: Up to 10 hours a day for roughly a 40 hour week for a lifetime.

MR. FRUMIN: For a lifetime?

DR. BAIER: That's continual. What we're saying is you wear it until the control, the positive engineering control has been instituted and installed and, in fact, in practice.

MR. FRUMIN: Okay. Do you have any experience with [1326] respiratory protection programs requiring the wearing of respirators for a full shift.

DR. BAIER: Unfortunately, I do, yes.

MR. FRUMIN: Could you make an evaluation of these programs as distinct from those which do not require full shift wearing.

DR. BAIER: All I could say is wear one for a day. That's about the best way you can change your mind about how effective and how well these things are received and actually applied by the workers.

MR. FRUMIN: We intend to do that at a more appropriate time. Go ahead.

DR. BAIER: Oh. Okay. I wasn't aware of that. Actually what we're saying is that there are times that a respirator has its place. Unfortunately, that's been taken to mean in lieu of everything else, let's pass out respirators. Bob works for these things every day and he probably did discuss problems with fit, problems with breathing resistances.

One of the fundamental problems is that most times a worker accepts a respirator because he's having problems breathing. At least, that again has been experienced. And at that time the resistance is maybe too much and again, you wear the respirator around your neck or on a nail.

Aside from the fit, ethnic differences in face structure, these types of things, universality of the fit, leakage, people [1327] with bears, people with scars, I mean the respirator is just no good for. These types of things. Bob, if you want to go a little further. Or maybe you did.

MR. SCHUTZ: I want to add one more thing. I think the question was our experience with continual respirator use. My experience has been that they are only accepted for continual use in areas where the non-wearing of the device produces immediate reaction.

DR. BAIER: Yeah.

MR. SCHUTZ: Or immediate hazard to the wearer or the non-wearer as the case may be. In this case, this seems apparent there is no immediate reaction unless the man is badly disabled to begin with.

DR. BAIER: Yeah.

MR. FRUMIN: Mr. Schutz, you talked about, you mentioned the immediacy of the hazard here and it is a short term phenomena perhaps. Have you any experience with a respiratory protection program requiring full shift wearing of a respirator for a period of years at a time.

MR. SCHUTZ: Not years at a time, no.

MR. FRUMIN: You have no experience with any such program.

MR. SCHUTZ: No.

MR. FRUMIN: Are you aware of any such program.

MR. SCHUTZ: I imagine they exist but I have no first hand knowledge of any such program.

[1328] MR. FRUMIN: What would be the longest requirement of any respiratory protection that you would have knowledge of.

MR. SCHUTZ: I've known situations where it may be as much as two weeks, emergency repairs eight hours a day in highly toxic atmospheres such as nuclear industry. Gas manufacturing plants.

MR. FRUMIN: Have these programs met with uniform success or are you aware of any problems in the administration of such programs.

JUDGE FATH: I wonder if we can't take additional notice of the fact that a worker will resist and decline the use of a respirator because it's uncomfortable, doesn't fit his face and really doesn't do the job. Can't we accept that.

MR. FRUMIN: Well, if all parties in this hearing would stipulate to that to the primacy of that notion, we'd be more than happy.

* * * * *

[1447] MS. SIMMONS: Since most investigators have shown that one can find respiratory symptoms in the absence of decrement pulmonary function and the reverse, would it be your opinion as a regulatory matter, a medical surveillance program designed to protect at the earliest possible time reactors should include both of these methods of control.

DR. MORGAN: Symptoms and decrement.

MS. SIMMONS: Should include both the questionnaire and pulmonary function testing.

DR. MORGAN: Yes. With the provisos that I mentioned yesterday and with the thought of a reducing grade 2 byssinosis rather than grade half. I think grade half byssinosis is a pretty nebulous entity and its importance is far from certain.

* * * * *

[1514] [Dr. Harley:] Grade ½ byssinosis appears to me to have been useful in a lot of the epidemiologic studies which have been done. Most of those which have been done on byssinosis have been epidemiologic. However, I don't think it is a very useful tool in applying standards for a medical surveillance program. It is something that a physician who is examining such records can use in that he can look at people who have so-called grade ½

byssinosis a little more carefully than someone else. But that is about [1515] as far as its usefulness goes. It is nebulous entity, it is not a disease.

* * * * *

[1604] Byssinosis itself, grades one half, one and two, in my opinion, really don't constitute much of a disease. It is a symptom that indicates that something serious might happen.

* * * * *

[1779] MS. SIMMONS: In your opinion as a physician, is someone with Monday morning chest tightness a person who is sick or ill?

DR. MARTIN: No. Do you want me to make it categorical?

* * * * *

[1881] DR. MERCHANT: My name is Dr. Merchant, from NIOSH. Dr. Imbus, in regard to medical surveillance, I believe in your statement, in your oral testimony, you spoke at some length of Burlington Industries' experience with medical surveillance?

DR. IMBUS: Doctor, I am not sure if I can—Repeat what you said; the last sentence. Burlington Industries' experience with medical surveillance?

DR. MERCHANT: Experience with medical surveillance?

DR. IMBUS: Okay.

DR. MERCHANT: Now, I believe you indicate that in order for a medical surveillance program to be effective, you must also have adequate environmental controls.

DR. IMBUS: Yes; I believe that engineering controls are a very important aspect of that.

DR. MERCHANT: Okay. Now, what proportion of workers do you feel a medical surveillance program could handle, in your experience, in terms of transferring people, reassigning people, things of that sort?

DR. IMBUS: Well, in my experience I don't think it could be a very high percentage. Certainly somewhere less [1882] than 10 percent, at any rate.

* * * * *

DR. MERCHANT: Okay; fine. Now, what factors would influence you, or would you recommend the Department of Labor adopt, for providing guidance for transfer of employees who are effected? What parameters in your mind are important?

DR. IMBUS: Well, as I mentioned the other day, I am against any automatic transfer triggered by any specific [1883] finding per se. I believe that people who are reacting either in terms of subjective symptoms or a decrement of FEV_1 should be watched very carefully. I think that individuals who show evidence of developing chronic obstructive lung disease should be evaluated by a specialist and I think this decision of transfer really should be made by a physician after some careful evaluation of all of the factors involved in the thing.

DR. MERCHANT: Now, do you think that physician should be the corporate physician, or should this be an independent physician?

DR. IMBUS: Well, here again, I don't know that I can recommend to the Department of Labor what physician it should be. I do know that in our own situation, that we have referred these people out to independent physicians to let them make an evaluation.

Now, we also have input into it, but we like generally to receive their recommendations on the thing.

DR. MERCHANT: And ultimately, who in Burlington Industries is it who recommends transfers? Is it you, or is it somebody else?

DR. IMBUS: It would be myself or my assistant, the assistant medical director, based upon the findings of the specialist.

DR. MERCHANT: Do you consider absolute level of [1884] FEV_1 before exposure in your evaluation?

DR. IMBUS: Yes. As a matter of fact, the absolute level of FEV_1 before exposure is one of the things that can trigger a special evaluation.

DR. MERCHANT: All right.

DR. IMBUS: Yes; we consider that a very important thing.

DR. MERCHANT: And is there a level that you use as a guideline?

DR. IMBUS: As a guideline for a comprehensive evaluation, we use an FEV_1 of 60 percent of predicted; but that can be more or less depending on—This is, as I say, a guideline. We have found a considerable number of people with FEV_1 less than 60, especially the older, slim females, that we did have a lot of them evaluated and found them to be essentially normal. So we don't always; but generally, that is it.

Also, an individual who is having trouble, who is complaining of substantial tightness in the chest, or reacting substantially. These are other guidelines.

* * * * *

[1896] DR. MERCHANT: Now, also, in your comment on Table 3, it says, "Even though dust levels here do not look inordinately high, it is obvious that further action needs to be taken to lower them, and medical surveillance is strictly an interim measure."

So in this particular instance where you are having dust levels of .4 to .5, I gather you feel that there is a need to lower them?

DR. IMBUS: We did, in this area, and I will tell you the outcome here. The carding area, which was very high, has subsequently been reduced from 1.92 milligrams to .4 milligrams and drawing and roving have decreased, have decreased—Drawing has decreased; and roving has decreased considerably, yes.

DR. MERCHANT: To what levels?

[1897] DR. IMBUS: Presently, the drawing is .35 and the roving is .06.

DR. MERCHANT: .06 for roving?

DR. IMBUS: Right. Right.

DR. MERCHANT: And what has happened to byssinosis prevalence and decrement in function? Do you have those figures?

DR. IMBUS: Byssinosis prevalence has dropped; the symptoms, symptomatic byssinosis, has dropped to 10 percent. There are 10 percent of the employees—I am talking about the overall card room area, now, and it is not a fair comparison. I would have to go back and break it out.—But of 49 people in the card room, it has dropped, the number of people with FEV_1 decrements, has dropped to 10 percent. So these figures are not exactly comparable.

DR. MERCHANT: Okay. And you say the decrement; and what about the prevalence?

DR. IMBUS: The prevalence of symptoms of byssinosis is 10 percent.

* * * * *

[1904] DR. MERCHANT: Now, Dr. Morgan told us that these cotton mills were not unrepresentative of the industry. Do you agree with that?

[1905] (Conversation off the record.)

DR. IMBUS: I think that they might not be unrepresentative of many of the blend mills in the industry. I certainly think there are quite a number of all-cotton mills which have much higher dust levels.

* * * * *

DR. MERCHANT: Now, in the figures that were provided by Dr. Morgan in regard to dust level, which I gather were done at the time of the survey; they represent the [1906] conditions at the time of the survey?

DR. IMBUS: Yes. We feel that they were; right.

DR. MERCHANT: We have calculated for Brighton a mean, and this is for carding only, of .3, and a median of .25, which is relatively close to the proposed standard.

* * * * *

[1907] DR. MERCHANT: Now, according to the figures we have been given, there would be some 40-odd people exposed at .5, and combining the two cotton mills, some 90-plus percent of [1908] the people in the survey would be exposed at .3 or .2 or even below .2. Is that not correct?

DR. IMBUS: Well, I don't know. How did you arrive at those figures—

DR. MERCHANT: Based upon the figures given to us.

DR. IMBUS: —because I don't have the figures with me.

DR. MERCHANT: These were based upon the figures that were given to us.

DR. IMBUS: Oh, you are talking about—In other words, what you did was you coordinated Dr. Morgan's figures with these dust levels; is that right?

DR. MERCHANT: Correct.

DR. IMBUS: I have not calculated, Dr. Merchant. I just would have to go back and look.

DR. MERCHANT: Okay. Is it not true that the only group in these two cotton mills that were exposed at .5 or above would be the carders at the Clinchfield plant?

DR. IMBUS: Well, I believe you see at the Clinchfield plant the opening is above .5; and that is the only other group I see. As the Brighton plant, we have the opening areas and one of the picking areas; and carding number 3, here, is above .5.

DR. MERCHANT: Now, Dr. Morgan, despite the [1909] relatively low dust levels, that the vast majority of these subjects, employees, were exposed at, he found what he considered to be probable or possible byssinotics by pulmonary function testing in 11 percent in both plants, based on decrements in function.

* * * * *

[2022] MR. GAWLAK: Okay. fine. I would like to now refer to exhibit 3. That is a letter to Grover N.

On page 4 of that exhibit you discuss the comparison of total dust to verticle elutriated dust. Now you mention that the fraction varies from process to process, is that correct?

DR. NEEFUS: Not only does it change from process [2023] to process but I have found out recently since I have been looking at the data a little more closely that the better collection of dust, the better capture of dust the closer the respirable dust is becoming to the total dust so it means that we are getting excellent lint collection. At least a lot better than we had so you really can only rely on any particular ratio between the total dust and the respirable dust. I don't want this to be misleading but our total dust sample is a little bit different than anyone else's. It is something John Lumpston and I dreamed up to try to have it reflect some meaning. In our discussions we tried to make it equivalent to the old 8 by 10 high vault total dust sampler. And so I believe that I have described that total dust sample in exhibit number one. So this is a reflection of that total dust sample to the vertical elutriator. I don't want you to be mislead that it is the OSHA type.

MR. GAWLAK: Okay, I see you don't want it to be misleading so I see we can't use the typical or the comparative factions that have been mentioned then? in this statement.

DR. NEEFUS: As you notice there I say the high otal. Because I want to make sure that you understand that it was not the OSHA total dust level.

MR. GAWLAK: I see, but in a general sense, in linty area such as the spinning and roving you will have a smaller per centage of vertical elutriated dust as total dust?

[2024] DR. NEEFUS: I didn't hear that, could you repeat that, I apologize.

MR. GAWLAK: Certainly. In a general sense, in linty air, such as spinning and roving you will have a

smaller per centage of vertical elutriated dust as total dust than you would have in a less linty area?

DR. NEEFUS: I don't know if that has any meaning at all. I don't think that you can rely on a ratio between total and respirable. There certainly has not been enough work done to make any kind of correlation between the two. The total dust sample is a very erratic sample. The respirable dust sample is not and, I have a feeling, is why NIOSH recommended to OSHA that we go to a respirable sample rather than a total sample. Because the total is unreliable and so why make a ratio between an unreliable and a reliable dust level.

* * * * *

[2094] [Ms. Norton:] I once dreamed of being a nurse, that was a hope, but I am a mill person so I went to work in the mill. I didn't know that that dust in the mill would one day give me a disease like brown lung. Nobody in the mill ever tested my breathing. There was never any kind of education about cotton dust being dangerous. We got x-rays in 1947 for T.B. but that was all.

When they started speeding the looms up the dust got finer and more and more people started leaving the mill with breathing problems. My mother had to leave the mill in the early fifties. Before she left, her breathing got so short she just couldn't hold out to work. My step-father left the mill on account of breathing problems. He had coughing spells til he couldn't breath, like a child's whooping cough. Both my sisters who work in the mill have breathing problems. My husband had to give up his job when he was only fifty-four years old because of the breathing problem.

The first time I heard anything about cotton dust causing lung problems was when I received a card from the brown lung association. There was a number on the card so I called it and I talked with a man for awhile. He said I might have byssinosis. That was in 1976 and

it was the first time I had ever heard of brown lung. Now I go to a clinic because I can't afford a doctor. I had to retire at age [2095] fifty with a breathing problem that has since been diagnosed as byssinosis caused by breathing cotton dust. I never smoked a day in my life. For twenty-four years I worked in the weaving plant and now that the dust has made me sick I have no job, no medical insurance, no pension. My husband worked thirty-six years in the mill and he got no pension. If you think you can trust the mills to clean up without a strong standard that is strongly enforced that you have to think again. The company has done nothing in the past to help the people and they will have to prove to me that they are sincere. They treat people as if they were nothing, not even as important as their machinery.

* * * * *

[2096] MS. MCCOY: My name is Odesine McCoy and I am from Spartanburg, South Carolina. I have worked in the mill for thirty-nine years, since I was fifteen years old. I worked in the mill because I never expected to do anything else. I always just expected to work in the mill all my life, my mother and my father worked in the mill, as did my brothers and my sisters. I lived all my life in the mill village. I retired in 1976 because of shortness of breath. I suppose I had a breathing problem since 1973. I just kept on getting sick and began losing time at the mill. Every time that I go into the mill I get deathly sick, choking and vomiting losing my breath. It would blow down all that lint and cotton and I have clothes right here where I have wore and they have been washed several times and I would like for you all to see them. That will not come out in washing.

I am only fifty-seven years old and I am retired and I can't even get to go to church because of my breathing. I get short of breath just walking around the house or dressing of sometimes just watching T.V. I cough all the time.

* * * * *

[2106] MR. WALTER JONES: My name is Walter Jones and this is the testimony of Mr. Louis Harrell, who was too sick to come.

TAPE RECORDING: My name is Louis Harrell and I have been in the cotton industry for 30-some years. In the [2107] last 13 years I have been having trouble breathing and been horrible. However that is where my work is and the last four I have allotted to—and I seem to be getting worse and worse in my breathing. I think they should give me a job where there is at least not so much dust. And they said they would lift for me one—well they admit to that five, six, ten months and then I got a slip from my doctor in Duke saying I had to get out of the dust if I were to survive. I gave that to them and that seemed not to make any difference. They just didn't come across with anything so I had to quit because I couldn't lay down and rest without oxygen in the night and my doctor told me I would have to get out of there and I walked across to the mill. I couldn't even breathe, I had to get out of the door so I could breathe and he told me not to go back in there under any circumstances. So that is how I come to leave.

* * * * *

[2132] [Mr. Sandlin:] And I have some masks here—different kinds, and I will put one on if you don't mind. This is what you're supposed to breathe through for eight hours. I can't breathe through one eight minutes. I got where I could not wear one at all. For even this time. And this is the glasses to keep the dust out of [2133] your eyes. You are supposed to work eight hours in this.

JUDGE FATH: I want the record to show that the witness has demonstrated the use of a respirator, is that what you call that?

MR. SANDLIN: Well, see, you can't. I can't breathe in one, they're hot, they don't keep out all the dust, they bother you about your vision—looking sideways from the corner of your eye, or even sometimes where

you're going, and they also—I don't wear glass but a lot of people do, and they fog them up quick, and they can't see. And they're just a nuisance.

* * * * *

[2143] MR. HASSELL: During the past two years it has been my experience to represent persons in compensation proceedings. My clients were employed by the J. P. Stevens Company in Roanoke Rapids, North Carolina, and Burlington Industries in Erwin, North Carolina. In connection with handling their compensation claims, it has been my responsibility to prepare their cases and to try to collect all the medical information that I could. In order to present their cases to the North [2144] Carolina Industrial Commission. And in so doing, I have inquired of the mills as to what sort of medical information was maintained with regard to pulmonary function studies performed on employees and other aspects of medical surveillance program that you have heard testimony about during the course of these hearings.

Among other things, I have learned from my clients, upon receipt of medical reports that were prepared by physicians to whom they were referred by the mills, that in some cases, their lung function was described as being "severely impaired" and in some cases the medical reports requested that they be transferred, and in some cases the medical reports requested that they not be permitted to work in dusty areas again.

The point that I wish to make is that in several of these cases, my clients informed me that they were NEVER informed of the results of the results of their breathing tests, and they were never shown copies of the medical reports that were prepared. And at least one case that I can recall to mind—one particular man continued to work in the mill for two years after a medical report stated that he should not work in a dusty area again. I asked him about the report, and he reported

to me that he had never seen it, never been furnished a copy of it.

* * * * *

[2145] I should cite the example of another client who worked in the mills for a number of years and who recently retired at a relatively early age, before 50 years old. And during the time that she was employed by the mill from 1970 until 1975, pulmonary function studies were performed, breathing tests were given to this person. But she was not informed of the results of those tests, and once we were able to obtain those records in connection with her [2146] compensation case, we learned that during each year that she was employed there was a serious detriment in her lung function, and she was never informed.

She was employed by the Burlington Company in Erwin, North Carolina. Which maintains that it has a medical surveillance program designed to inform their employees of their health condition with respect to breathing.

* * * * *

[2147] I would just close by saying it has not been my experience in reviewing cases—medical cases of persons who are seeking compensation—that they have been adequately informed of the results of their breathing tests, and in some cases they have not been provided copies of the reports prepared by specialists.

* * * * *

[2148] [Mr. Baldwin:] And I also was talking about letting the mill company run their own medical programs, measuring their own dust, running their own educational programs for employees about the dust. I don't think that's going to work anyway. —mill working will be—and in my story I will show what they have done [2149] in the past.

When I was working in textiles, the Company never said anything about cotton dust being harmful. And

even if they had, there wasn't much a person could do about it. Working in textiles was all I knew. We all knew that we had to work until they carried us out or you come out on your own. When I went to work in textiles, there was nothing in the world except cotton mills and farming.

I have been bothered by this chest trouble and I had it six or seven years before I quit working in the mill. The doctor who is the company doctor never called my lung problem nothing—he never said what it was, and now he is our main doctor, not necessarily because he is a mill doctor. I don't guess he was at the time he came to (?), but he certainly is one of them now. That's because he got most of his business from the mills. He used to come to an office there and—him and a nurse with him, and if you got hurt or anything that you needed to be—call for a doctor, you could see him on Thursday, because they wanted you to see him on Thursday. The boss didn't give you nothing but hard times. When you weren't able to run your job they just pitched you out and got somebody else.

* * * * *

[2150] I have been diagnosed as total disability with brown lung. * * *

* * * * *

[2152] MRS. SANDERS: My name is Reber Sanders. I went to work in the mill—the cotton mills—when I was 14 years old. And I worked a little more than 40 years in the cotton mills and (?)—the mill to clean up the dust—I want to tell you about it—how it costs me to have this disease. My breathing problem started about three years after I started working in the mill. I broke out all over from being in the dust and had to cover my nose with my hand all the time that I was breathing. They got me out of the mill once for nine months, and I felt like I was 16 years old—just as soon as I went

back in the mill the same thing came back on me, so the doctors told me I just had to let it go—that I couldn't stand it and I couldn't be alive for three weeks if I didn't get out of the mill. The Company told me they couldn't work me because I had insurance in the mill and I was in the hospital every [2153] two months and said I was costing them more than I was doing, so they let me go on account of being too sick to work regular. I didn't get one dime from them—not even insurance.

Medicare paid some of the medicine bills in the last 13 years, but not much. We paid about $30 a month just for medicine, and sometimes $100 for doctor bills. We had to sell our house because we couldn't afford to make payments—the cost of it and keeping it up. My breathing problem is also caused by heart problems. Last summer I had to go—I had a heart attack when I got to the hospital—they asked me what caused me to breathe so hard. They took an X-ray of me and found that I had—that my lungs nearly collapsed, and that had made me have that heart attack—breathing so hard it made my heart weak.

* * * * *

[2154] I go to bed at night and that stuff just foams in my throat and it just comes out in big rolls. I have to take paper towels to bed to get it out. * * *

* * * * *

[2187] [Mr. Graves:] They never told me to wear a mask or anything. They just had us wear safety glasses or goggles. Up to 1974 when I came out I never saw a mask at the mill. The dust put me out of work eleven years before my time. About 1965 I started getting short of breath and got to coughing all the time. I kept on working and it kept on getting worse. The last few [2188] years I worked I missed a lot of work. I was in and out of the hospital so many times I can't even remember just how many times. My doctor kept trying

different medicines and he finally said he had given me everything he knew to give me. The only thing he knew was for to get a transfer to another part of the mill. But the mill kept saying there are not any jobs to transfer you to. Even though they knew I was bad off. They said one time if you are unable to run your job we will have to replace you. My doctor said that I should get out altogether. That it would shorten my life every day that I was in there.

But I knew that I had to go to work. I had a wife and three children at home to support. I just went back and kept trying and trying. I finally collapsed on my job and and never went back. I got my disability at age fifty-four, not able to work anymore and support my family.

My point in telling my story is this, the company never educated us about the effect of dust even when they knew. I dont' think they will do it right even now. When they started the breathing tests they never told us what it was for and we never knew. The company let me work overtime every weekend cleaning up that cotton dust but they never told me it was bad for my lungs nor even gave me a mask to wear. They wouldn't even transfer me out of the dust where my family doctor wanted it. * * *

* * * * *

[2376] [Mr. Hocutt:] The capture system is the real problem or more specifically, it is the difficultly of applying known dust capture technology to the processes of spinning, yarn preparation, and weaving. The filter requirements in those areas are no more difficult than in opening or card rooms; as a matter of fact, it will be cheaper per CFM because there is less quantity of dust.

When we cannot apply dust capture devices directly to the point of dust generation, as we cannot in spinning, yarn preparation, and weaving, we can only make up the

deficiency by using massive, wasteful, and expensive air quantities.

* * * * *

[2377] The ring-spinning and yarn preparation machines that we have described are the most modern. And I don't claim to be any expert on open-end spinning, but I am told by people who are that it represents less than 4 percent of the production in the U.S. now; and none of the experts that I know expect it to ever replace more than 30 percent of the ring spinning, because of the difference in the characteristics of the yarn, which is a basic difference.

* * * * *

[2388] MR. GAWLAK: I see. So you are just maintaining your present statement that we are not going to advance much in the next seven years in these processes we are discussing.

MR. HOCUTT: Or, I can put it another way. I think the only way that it could be effected would be in totally new technology, which obseletes and eliminates need for the textile processes now in use.

MR. GAWLAK: I see. But you are not talking about —You don't foresee any new dust control technology.

MR. HOCUTT: No. No; this is a very old art. The [2389] first movement of air for cleaning of the air was with the cavemen. They dug a tunnel from the back of the cave to the surface and induced a draft so that they could build a fire in the cave and the draft came in through this opening and it went out that opening, and that is the way they cleaned the air.

I know that there isn't very much new going on because we find it very difficult to get a patent on anything. Now we get patents on the nuts and bolts; but talk to lawyers and find out how many landmark patents there have been in ventilation and lint and dust control systems over the past 10 or 20 years. It is old, old art.

MR. GAWLAK: Okay, Mr. Nocutt. Let me move on a bit. You speak of hypothetical dust control systems in the processes past roving. Have you tried, has Pneumafil tried, any prototypes of the systems you mentioned?

MR. HOCUTT: Some, yes. We have buried a great deal of money we would like to have back in that kind of research.

(Laughter.)

MR. HOCUTT: You don't do that very long, see, before you have to stop and work on something that is practical.

MR. GAWLAK: Well, for instance, have you tried one of these systems for, let's say, one of these systems where you would require a barrier that you showed on the screen [2390] and would push the air through the floor. Have you tried any of those systems?

MR. HOCUTT: Well, I am disappointed. I thought I had shown that it is impractical to do that on a ring-spinning frame, because of the requirement for the overhead-traveling blower to blow on the roller beam and the drafting system and on the ring railer.

MR. GAWLAK: Right, sir. I understood that; but you didn't quite make it clear why you would need the traveling blower if you had massive air blowing through all of those devices.

MR. HOCUTT: Now you are getting into the difference between blowing and suction. There is a vast difference. Let's see.

I can set a candle on the edge of the table, and blow it out, but I can't suck it out.

(Laughter.)

MR. HOCUTT: On a more technical basis, the pressure on a suction orifice, when it is equal to the diameter of the orifice, when the pressure is measured at a point equal to the diameter of the suction orifice away from

the orifice, the pressure has dropped to 10 percent of the pressure in the orifice. Now, the carry on air-conditioning ducts, whenever you are blowing, is about 30 times the diameter of the duct. And so the answer to your question is that you can't [2391] suck the fly off the ring rail. You can blow it off, but you can't suck it off, see. You can suck it off the roller beam and away from the drafting system. You cannot do it with suction, but you can blow it off, see.

MR. GAWLAK: Okay. In general, then, you have tried many of the systems that you have addressed hypothetically, then, in your—

MR. HOCUTT: We have addressed all of these problems at one time or another, or we know what somebody did in Japan, or what somebody did in Germany, or what somebody did in England. And I have a flow of paper that covers me up; I can't read it all, of that kind of stuff, see, so—

MR. GAWLAK: Okay.

MR. HOCUTT: I don't believe anybody here could mention anything that hasn't already been tried and evaluated.

MR. GAWLAK: Okay. Let me—

MR. HOCUTT: I have a $3,000 machine in my lab that was built to move from loom to loom, and clean a loom; and it was a $3,000 disaster. It is not a practical thing. It looked very smart to start with, but we won't spend any more money on that kind of things.

MR. GAWLAK: Sir, have you tried any of your systems in a mill situation; any of your—Any of the prototypes? Or did you just discontinue at the prototype stage?

MR. HOCUTT: Are you talking about weaving?

[2392] MR. GAWLAK: Anything past roving.

MR. HOCUTT: Oh, we don't consider anything as having been tried until it is operated in the mill. I can make perpetual motion work in the lab.

MR. GAWLAK: No, sir. Well, let—No, really; I guess I don't understand what you are saying. You have tried prototypes in your lab, but you have never tried any of these prototypes in the mill?

MR. HOCUTT: No, no. The machine that was developed for cleaning a loom, you know; this—Whether it was effective or not was proven in the cotton mills; not in the lab. What I am saying is we always test these things in a mill.

MR. GAWLAK: Okay. So when you are saying you have discarded some of these hypotheticals in your paper, you have tried—

MR. HOCUTT: They were all tested. They were all tested in operating mills.

MR. GAWLAK: Fine. Thank you.

MR. HOCUTT: I described the development of the application of electrostatic precipitators to these filter systems, in my written testimony. Now, we did that for three years, but all of the experimenting and all of the testing was done in an operating cotton mill.

MR. GAWLAK: Fine. Do you see any input from other [2393] dust control technologies, non-textile?

MR. HOCUTT: We make filters for the furniture industry; we are, I am sure, the leading supplier of filters for wood dust in the United States. We are making filters now for the grain industry. We make specialty air-washers for all types of industrial applications and specialty air-conditioning products; so yes, we have quite a broad application, I think, of other technology, and world-wide communication with people who are prominent in the business.

We have access to all of the technology of the largest manufacturer of air conditioning for textile mills in the world, and also the largest manufacturer of air-conditioning systems for comfort cooling and noise and dust control in Europe. We have access to all that technology, for instance.

MR. GAWLAK: Mr. Hocutt, would you say, then, that the state of the art in dust control technology past roving, from roving through weaving, is frozen, then?

MR. HOCUTT: I would say that the state of the art is what I have described.

MR. GAWLAK: Okay. And it is not advancing. It won't be advancing in the next seven years?

MR. HOCUTT: Well, I cannot envision any breakthrough that will solve the problem in existing mills. I certainly do not.

[2394] MR. GAWLAK: Okay. Let me move on. In talking about your study, there are a few assumptions I have made, and I want to make sure they are correct. We are talking about cotton mills; pure, 100-percent cotton mills?

MR. HOCUTT: No. Cotton mills or cotton and synthetic blend mills.

MR. GAWLAK: What kind of blend would we be talking about? Percentage?

MR. HOCUTT: Whatever the blend; any, the complete range.

MR. GAWLAK: Okay. So when you give a—

MR. HOCUTT: Aw we understand the OSHA standards, they apply in processes with blends, no matter what the proportions.

MR. GAWLAK: Would it not be true that the amount of lint you would get from a 15 percent, 15 percent cotton, 85 percent synthetic, would be less than you would get with the reverse proportions?

MR. HOCUTT: Well, not necessarily, because in many mills, the cotton would be run through many of the processes before it is blended with the synthetics. And so in that case, you would be dealing with 100 percent cotton until the blending operation. Quite often that doesn't take place until the draw-frame.

* * * * *

[2396] MR. GAWLAK: I understand. Mr. Hocutt, in your statement, when you are discussing warranties, you mention that you would offer a warranty of 1 milligram total dust, or .5 milligrams of vertical-elutriated dust. Are you implying some conversion there?

MR. HOCUTT: Well, we find that in the areas of opening, picking, and carding, that the vertical elutriator reading is likely to be about half of the OSHA aerial sampler reading, if that answers your question.

MR. GAWLAK: And those are the only areas where you would—

MR. HOCUTT: You were asking about the correlation between the samplers, I believe.

MR. GAWLAK: Right. That is more or less what I was getting at.

MR. HOCUTT: Right.

MR. GAWLAK: Is that only valid in those three operations?

MR. HOCUTT: Oh, yes. It is only valid in those areas, because the ratio of lint to dust changes, after you pass carding.

MR. GAWLAK: Could you give us your opinion as to what the correlations are in further processes?

MR. HOCUTT: No, we never have—I don't have enough data to be useful, I think, beyond that area; but you [2397] see, all of the work we have been doing is in opening, picking and carding, and we have piles of data on those areas.

MR. GAWLAK: Do you have any feelings for the trend? Are we getting a smaller fraction of vertical elutriated dust as we move on down the processing line?

MR. HOCUTT: Well, I don't think there is any question about that, what data we do have indicates—And of course, there is a more practical reason for that being true. Every machine cleans some dust out of the cotton.

The draw-frame takes out surprising amounts of dust. And all you have to do is walk through a mill and look at the waste that is formed at each machine.

* * * * *

[2419] MR. HOCUTT: Well, I'm beginning to wish I hadn't said anything about this, which I did, and I have to be helpful. Practically all of this information that I have is confidential and I couldn't reveal any of the sources. You can only take my word for the figures. I can't substantiate it in any manner. Shall I proceed?

MR. GAWLAK: Proceed.

MR. HOCUTT: 28 percent of these looms then, would be greater than .75 milligrams per cubic meter. 52½ percent [2420] would be greater than .5. 69 percent would be greater .35. 83 percent would be greater than .2.

MR. GAWLAK: Sir, as of what date are these figures?

MR. HOCUTT: These figures include all of the dust level data that we received from the ATI people, along with a questionnaire which I described in my written testimony, plus all of the dust level reading in weave rooms that we have in our files at Pneumafil Corporation.

MR. GAWLAK: Okay, sir. Now, these two—the ATI report and the Pneumafil report are combined for the data you just gave us? The reports from your files from the ATMI survey you refer to in your—are combined?

MR. HOCUTT: We added to the data that was given us by ATMI, along with the questionnaire.

MR. GAWLAK: Sir, you mentioned that confidentiality. Are you referring to the material in Pneumafil files?

MR. HOCUTT: Am I referring to what?

MR. GAWLAK: The material in Pneumafil's files. You mentioned the ATMI and the Pneumafil files.

MR. HOCUTT: Well, I—

(Witness confers with Counsel.)

We cannot identify the source of any of these measures.

MR. GAWLAK: Sir, are both sets of material [2421] confidential?

MR. HOCUTT: We don't have any data of this kind in our files from any cotton mill in the United States that is not confidential.

MS. SIMMONS: Your Honor, at this time the agency would like to request of Mr. Tobin as the representative of ATMI, that ATMI furnish both a copy of the ATMI questionnaire referred to by Mr. Hocutt in his testimony and all responses to all questionnaires sent to all member mills which represent 369 completed questionnaires. This would include data on the processes in the mills, the state-of-the-arts with regard to machinery and engineering controls, and all environmental dust sampling. We also request at this time the additional environmental dust sampling data provided by ATMI on the 70 mills, as stated in Mr. Hocutt's testimony.

In addition to this, to the extent that this questionnaire or another questionnaire was the basis for the information on medical surveillance programs and sampling data, the results of the questionnaires in pulmonary function tests, of which were used by ATMI as reflected in the survey presented by Dr. Imbus in tables 1 through 4 of his testimony. If this request as stated on the record now is not sufficiently specific, Mr. Tobin, I would like to know now.

MR. TOBIN: Well, it went fast enough so that I couldn't keep up with it. If there is any request like that, [2422] Your Honor, 1) we would prefer to have it in writing, 2) the reason a great deal of this information is confidential, as far as—not a great deal—all of the information is confidential in regard to the dust level reading, is that the back-up data that is involved would contain information that would reveal competitive items, even if the names were deleted from the return of the

questionnaire, that would place each individual company at considerable competitive disadvantage in relation to the other, because it can be deduced from this kind of information—what kind of yarn is being run, what kind of counts, what kind of end product, and obviously in a highly competitive and fragmented industry such as the textile industry, considerable damage would be done to each individual company by revealing this kind of information. That's not a final answer to the request. But I want to point that out and make it clear on the record that that is in fact the case.

MS. SIMMONS: Mr. Tobin, I would like to if I might, obtain a final answer at this time. The agency requests that this material be furnished to it a week from tomorrow, which I believe is May 7? May 6.

MR. TOBIN: Well, I am not going to give a final answer at this point, Your Honor. I also think there's a severe question of appropriateness in if this information was furnished—it would be furnished in any event in some form before the record closes.

[2423] MS. SIMMONS: Mr. Tobin, the request being made by the agency is that the information that I just specifically described be made available one week from tomorrow, May 6, while the record is still open and while the hearing is still on-going. I would like a definite response on the record to this request at this time.

MR. TOBIN: Well, if you're going to force me to give the answer at this time, the answer is no.

MS. SIMMONS: Okay, fine.

JUDGE FATH: Ms. Simmons, this is a matter of request I think with serious import. Before Mr. Tobin and ATMI, and when I understand that you would like an answer right away, I think that we ought to delay our response for an hour or two to give Mr. Tobin an opportunity to consult with his clients. I think this is only fair. Additionally, Mr. Tobin has requested that you put your request for specific items of information in writing; you might consider that.

MS. SIMMONS: Yes, Your Honor, I will—would be very willing to put this request in writing and to present it to Mr. Tobin some time during today, if I could possibly have a response from him by the close of this hearing today. The other thing that I would like to state for the record at this time, is that it is the agency's intention in the event that this request is denied to pursue compulsory process in obtaining this data.

[2424] MR. TOBIN: Apparently, Your Honor, we can't pursue compulsory process to Dr. Bouhuys' study and published report, so the question of fairness does enter into the proceedings.

JUDGE FATH: Mr. Tobin, I don't think there is much I can do about all of this. I have taken the position and I think I'm correct in that I can't require the production of any documents or rule on the propriety of your response to the request for information. I suggest that we pass the matter now, and I ask that you give some definition of your position before 5:00 in the recess this afternoon. Is that satisfactory?

* * * * *

[2437] DR. LESOURD: I understand. Partly, this is to help me understand. Another question. If you—at the drawing and roving level in the dirty or dusty mill, or the category 1 that is the larger problem, you use a considerably higher air-flow rate on that area of drawing through roving. If this were used in another—let me back that. Is it possible to use this sort of high-efficiency cleaning, that is, high air flow, where the cotton is not so dirty, and thus reduce the dust in later processes. Does it have to be in this combination? You see what I'm driving at?

MR. HOCUTT: I'm not sure I do, but I say again, [2438] I am trying to compare extremes. In category 1, I have tried to describe a mill that would require the most of everything in terms of lint and dust control, and in category 4 a mill that would require the least.

DR. LESOURD: Well, let me amplify it just a little. Yesterday I think I remember your saying that the roving is a very dusty process—that this is one that generates a lot of dust—the process tends to be one—

MR. HOCUTT: Well, I think I said that about drawing because roving, you can expect to be about half as much as drawing.

DR. LESOURD: Drawing and roving. More broad.

MR. HOCUTT: Yes.

DR. LESOURD: At any rate, in this part of the process, we are concerned about the possibility of meeting the .2 level, or even .5 at weaving, and of meeting the .2 in the spinning, winding, spooling area. My question is "If we applied a more efficient cleaning at the drawing-roving stage, not the minimum necessary to meet the .5 —but the maximum cleaning that could be accomplished there, would this reduce the dust, then that would occur at the subsequent stages, and would this make it more possible to reach the lower standards at the stages after combing, or spinning it on? See what I'm driving at? You've indicated—

MR. HOCUTT: I think I do. You're saying if we [2439] collect and filter out dust in one process, does it make the machines in the subsequent processes generate less dust? I think it probably does, but I have no idea of the degree.

* * * * *

[2450] And I talked to Arthur at some length. We tried to estimate these things, and we arrived at some figures which I gave for weaving. Now, spinning frames —spinning is not usually on the ground floor, except of course in one-story mills. Most new mills are one-story mills, and quite often that is on a concrete floor, and you, of course, can realize there is a ridiculous problem of installing duct-work under a concrete floor.

But the problem in spinning rooms in older mills which are multi-story is that we have some room in the

operation underneath the spinning room floor but we don't have unlimited room. We cannot get ducts in these rooms that handle five or six thousand cfm per spinning frame. The broken ends collection system handle from, say, 1,000 to 1,600 cfm, and maybe some are more than that, and some go up to like six cfm per spindle.

And at that point we have about reached the air quantity that is necessary to condition the room for temperature and humidity control. At anything beyond that, as Mr. Thomas I am sure will tell you, it begins to throw things out of [2451] balance.

Now, as long as the duct size is controlled by 1,000 to 2,000 cfm per frame, we think we could get some of these in, see? But there is just not going to be space for these larger air quantities that would be necessary to lower dust levels that we have used for the basis of our figures.

And in weave rooms, of course, we usually find these on the ground floor. And we have estimated—by "we" I mean the knowledgeable people that I have conferred with to try and find some numbers to answer your question—maybe 10 percent of the mills in the country would have some area underneath the weave room floors which would be adequate for ductwork to handle air quantities that we have specified in our report.

DR. LESOURD: Thank you. I think you have indicated that new equipment, like new cards, or automatic opening systems have built in some dust control equipment, and that in addition, they need engineering controls added to meet the .5 to .2 standards that are proposed.

MR. HOCUTT: That is true, but I want everyone to understand that the only thing you can build into the machine is the dust-capture system.

DR. LESOURD: Right.

MR. HOCUTT: None of these machines have filter systems built into the machine. That would be absurd.

* * * * *

[2464] MR. HOCUTT: Bob, we can achieve with the old machinery now existing in the mill any dust level that can be achieved with any new machinery. There is no magic in the new machinery. When you buy new machinery, you are buying built in dust controls. On the old machines, we put the same kind [2465] of things on the old machines. There is a difference in air quantities that do affect costs because it is more efficient to design these things all at one time than separately but they can't do anything except what we are doing. The end result is the same thing.

* * * * *

[2494] MR. PERKEL: Is it fair to say then that you made a judgment with respect to every type of equipment that all of the manufacturers of and installers of this type of equipment made since 1961? And made a judgement as to which ones of them were still usuable toward the goal in mine and which were not. Is that correct?

MR. HOCUTT: Yes. And this is made easy, Mr. Perkel, because we were about the only ones until in the early '70s that did any of this kind of thing except on cards.

MR. PERKEL: But in cards, you did have to go through the other vendors information of this sort. Is that right?

MR. HOCUTT: Yes.

MR. PERKEL: Would you make available to us the information that you used as a basis for deriving these figures?

MR. HOCUTT: I couldn't do that. It is not my information.

MR. PERKEL: I am telling you about the information of the Pneumafil Company.

MR. HOCUTT: That information was gathered by HMI. [2495] I don't own it.

MR. PERKEL: Your Honor, I would like to make an observation if I could about the last response from this witness. It seems to me that by referring to some other data or some other source, he is in effect foreclosing our right to question him concerning the basis for his estimates. If we don't have the data, we can only have his conclusions and therefore, we are foreclosed from exercising our right to question him.

JUDGE FATH: Well, Mr. Perkel, as I have stated again and again, I don't have the authority to force the disclosure of these sources. The record will contain your objection.

* * * * *

[2503] MR. PERKEL: On the bottom of page 4, you described certain tabulations that you made or were made of each type of processing machinery. Some of it we based upon the HMI survey that has been referred to here. Is that correct?

MR. HOCUTT: You are talking about the last paragraph, Mr. Perkel?

MR. PERKEL: Yes. Is this the information obtained from the ATMI, sir?

MR. HOCUTT: Let me read it, please, so I will know what you are talking about. Oh, yes. Now, what is your question?

MR. PERKEL: Was the information that you refer to on the bottom of page 4 obtained from the HMI survey?

[2504] MR. HOCUTT: Yes. This was taken off of the questionnaires.

MR. PERKEL: And you performed certain operations in order to calculate the area of quantities required in the course of the equipment. Can you tell us what you did to those data in order to arrive at your estimates? How do you go about doing that?

MR. HOCUTT: We tabulated a number of machines and then we used our standards for air quantities for dust controls and applied this to—multiplied that by the number of machines and we arrived at a total air quantity and we had also calculated an average, industry average price for that type of application so we multiplied that by CFM and that gave us a total dollars for that type of machinery.

MR. PERKEL: Well, getting back to that one set that you just described. Are you saying that when you had the data from the questionnaire that tells the equipment in a mill, you have some standard tables that give you the quantity of CFM that is required to reach various levels, that applied to different types of equipment of different ages?

MR. HOCUTT: Oh, you certainly have seen some of these in our NIOSH reports. Some of those data are still good. Some have been modified.

MR. PERKEL: Well, I am not asking you whether I have seen anything. I am asking you a specific question and [2505] I would appreciate it if you would answer it.

MR. HOCUTT: I will try, Mr. Perkel.

MR. PERKEL: Okay. Do you have certain standard tables that you use that you applied in this case to all of the equipment that is reported in the HMI survey?

MR. HOCUTT: We have guidelines on opening, picking and carding. And the air quantities for draw frames and roving frames and combers are based on established functions of the machine which are pretty apparent. Now, beyond roving, this was a matter of getting the best informed people in our company together and I said somewhere in here that beyond roving, it is all educated guessing.

* * * * *

[2559] MR. GAWLAK: In places you have used the term "the investment will be non productive." Now, the RTI estimate was based on more or less of a static tech-

nology situation. We talked about retro fitting of machinery, they did not really discuss modernization such as the installation of high speed cards. Now to the extent that there is modernization that wouldn't be reflected in your statement, is that true.

MR. FIGH: Maybe this doesn't answer your question, but I think maybe it will clarify the issue that you are addressing it to, I think if you take a say a small to medium sized mill and they come into us to borrow money and they want to buy open end spinning equipment as adverse to strictly non productive. I think we would tend to look at it a lot more favorably because we would see a cash flow on a pay back on that equipment, whereas they come in and have to buy equipment that is going to cost them more to operate, I think it would be a much more difficult thing to finance.

I know that doesn't answer your question exactly, but I think it hits the issue.

MR. GAWLAK: No, fine, that did bring to light something I was interested in, thank you.

Sir, could some small companies processing pure cotton find some relief in a switch to a cotton blend?

MR. FIGH: I would expect most of them have and as [2560] a matter of fact I know a number of both small and large companies that are going over to the polyester blend and I think there are a number of reasons for that. I think part of it is properties of the fabric and the consumers are adjusted to it.

There has been a trend that way, but again there are certain products that I think are going to tend to have to always be cotton. I think towels are one that would be predominantly cotton where you need the absorbence and the polyester does not have the properties, so you have to live with that.

MR. GAWLAK: Right, but there will be some relief for small companies, you would agree with that?

MR. FIGH: Well, I think you have probably seen the greater relief already. I think that the polyester has

grown at the expense of cotton over the last 10 years and I think it has penetrated most of the markets that it can penetrate. There are some markets where you have to take into consideration the consumer preference like many men prefer a 100 percent cotton shirt.

And if you take that off the market they can certainly live and have a polyester blend shirt but if the consumer wants it, then where are they going to get it?

MR. GAWLAK: Then you are saying that there has been so much conversion that you don't envision any further [2561] conversion to greater synthetic blends or to synthetic blends?

MR. FIGH: I wouldn't use the word any, but I think the majority of it, the growth of polyester at the expense of cotton, has been completed. There are areas that are effected there, there are economic factors and there are market factors. But I think the greater part of that growth has happened already happened.

MR. GAWLAK: Okay then, so to the extent the dust levels are reduced, that has occurred already.

MR. FIGH: From the polyester, to a great degree, yes.

MR. GAWLAK: Could you tell me when this change has been occurring, how long it has been occurring, when the bulk of it has been completed?

MR. FIGH: Well, I guess it goes back maybe to a little bit before my time in the textile industry, but as early as the mid-1950's, there began to be these wash and wear shirts that were blends of polyester and cotton.

They were a very small percentage of the market and over the years that percentage has grown and the blends of the man-made fibers with cotton have continued on a relatively steady basis. Mid '50s I would guess, somebody can correct me on that.

MR. GAWLAK: Would you say the bulk had converted [2562] sometime in the '60s, could you in any estimate that?

MR. FIGH: It was probably in the '60s and through 1974.

* * * * *

[2592] MR. CHAPMAN: I could not give—the dust control system is built into the spinning frame, and by buying open-end spinning, we were able to combine three machine processes into one, and rather than having to put dust removal equipment on the roping frame, which prepares to slide up for the spinning frame, and then on a winding frame, which we would have to take up after the spinning—after convention spinning—we were able to combine roping, spinning and winding into one machine, have all the dust removal equipment on that one machine. So as to how much, all I know is that when we bought 26 of them from flat, we had to install some American dust removal equipment to make it work the way we wanted it to.

MR. PERKEL: And did that affect your cost in the same way as your reference before—

MR. CHAPMAN: No. No. It reduced our cost.

MR. PERKEL: Beg your pardon?

MR. CHAPMAN: It reduced our cost.

[2593] MR. PERKEL: It reduced your cost.

MR. CHAPMAN: The open-end spinning did.

MR. PERKEL: I see. So, by installing open-end spinning, you not only reduced your dust level and combined three operations into one, but you reduced your unit costs. Is that correct?

MR. CHAPMAN: Not when we added all together. When we took the opening through the open-end spinning—

MR. PERKEL: I wasn't talking about opening, sir. I was talking about the specific open-end spinning which is discussed—

MR. CHAPMAN: I was using the unit label cost. We did not reduce our overall cost because of the cost of capital.

MR. PERKEL: And you are talking about open-end spinning—the substitution of open-end spinning for the ring-spinning and winding and robing? It reduced your labor cost and not your overall cost. Is that your statement?

MR. CHAPMAN: Right. Cost of capital.

* * * * *

[2950] MR. GAWLAK: Fine. Thank you. Is it possible to compare the cost of controls of new equipment with the cost of controls to retrofit old equipment? Can that costing be made as a comparison?

DR. REIST: Let me thing. When you say new equipment, you mean a second generation high speed cards versus dimensional cards?

MR. GAWLAK: Yes.

DR. REIST: I am sure that these comparisons can be made for specific units but it would seem to me that to try to get too much detail, you couldn't generalize too much, except to say that everything that we have seen seems to indicate that [2951] it isn't excessive. In other words, it seems to me that you gain by going to new units of new control.

MR. GAWLAK: Okay. Let me ask you another question. It will be somewhat general and perhaps also a bit more specific at the same time. If air flows are similar, would the capital cost of controls for old and new processes be similar?

DR. REIST: If their air flows were the same?

MR. GAWLAK: Yes. Would the capital costs be the same for retrofitting old equipment and installing new equipment?

DR. REIST: I expect they would be less for the new equipment because you are talking about air flows in terms of so many cubic feet per minute per machine, but the machine's productive capacity has been increased by maybe a factor of two to four. So, for the same productive capacity, you have actually reduced the number of

machines. Therefore, you would reduce the total air requirements.

MR. GAWLAK: Dr. Reist, you indicated that high speed cards cannot be used for all grades of cotton. Do you know of any other limitations to the introduction of high speed cards or opening equipment?

DR. REIST: We didn't come across any other ones that I can think of. No, nothing jumps to mind.

MR. GAWLAK: Do you know if the extra cleaning we would see would affect process quality, affect product quality?

DR. REIST: From what we have found, you really have [2952] to consider two factors. First you have to consider the effect of additional flow within a machine on product quality. I think I mentioned yesterday that it seems that maybe 1500 cubic feet per minute per card might be an upper limit. I have just seen that once or twice. So beyond that, there would be and effect on product quality.

On the other hand, the fact that there is ventilation, there is air cleaning there, since the carding process does liberate dust, lint, and so on from the raw cotton, that having some ventilation certainly would, I would think, improve the cotton quality because it would keep it from collecting in the machine itself.

MR. GAWLAK: Fine. Do you know from your survey if the introduction of new equipment or processes has required building modifications or construction?

DR. REIST: I would think that there would be. I know that some of the new high speed cards are substantially heavier than the conventional cards. I don't know much about the load-bearing capacity of cotton mill floors, but I would imagine that that would certainly have to be taken into consideration and that might be a factor. But in our processing that I cited yesterday, all of these items were included. Those were the total costs for that particular mill when the three alternatives were

considered. Even considering whatever changes were necessary, the comparisons were still favorable.

[2953] MR. GAWLAK: I see. Would there be any construction or modification costs involved in any other process than carding that you know of?

DR. REIST: Beyond carding you mean?

MR. GAWLAK: Yes.

DR. REIST: I don't know. We didn't look at that.

MR. GAWLAK: Do you know if there will be any construction costs related to the dust control equipment as opposed to the card itself that might require extra construction?

DR. REIST: One thing that definitely is required is a fairly good filtration system. In order to get this, generally you would expect to pay slightly with a greater pressure across the filters. You need more suction in the system essentially. This means a slightly larger fan size. I don't know whether that would require substantial modifications or not. There would have to be some modifications. I might point out though a fact which has been recognized, of course, and I think is one of the big selling points in going from the slower speed cards to higher speed cards is that, again for the same productive capacity, a lot of floor space is freed. In other words, if you go from 100 cards to 30 cards, you free up the space that those other 70 cards occupied.

MR. GAWLAK: I see. So in a sense then, you would have more room to put in dust control equipment which might otherwise have to placed on the roof or outside, is that correct?

[2954] DR. REIST: You could look at it that way. I think one of the things also is you certainly have less runs of ducts. The duct lengths can be less. You have concentrated the forces in a small area. Just from that standpoint alone, I am not sure I could say it becomes easier to do, but at least you got it all in one spot.

MR. GAWLAK: Okay. Another question that I am interested in is how would construction or modification costs for new equipment compare with modification or construction costs to install controls on existing equipment?

DR. REIST: From what I have been told, one of the problems with existing equipment is that great illustration that was in the NIOSH book, and I guess you every now and then, I'll bet it is in the record somewhere, of the cotton card showing the 12 points of dust emission. One of the problems with installing controls on existing equipment is to pick up the dust emitted from those 12 points. Now I understand with some of the newer card designs, the number of emission points have been reduced, so it could be a little easier to control as there are less places the dust can come from the machine. But that is what I have heard, I couldn't give you a specific reference.

MR. GAWLAK: Let me ask you to direct yourself also to point of physical construction in the mill, if we compare the old to the new processes from a physical construction [2955] viewpoint. Could you compare those costs at all?

DR. REIST: If I understand your question, I am not sure I can.

MR. PERKEL: Ask him to clarify it.

DR. REIST: Let me repeat it and you tell me if I have got your question right. You want me to compare construction costs for new equipment versus modifications to existing equipment, is that right?

MR. GAWLAK: Yes. In a general way.

DR. REIST: This is just a guess, a guess based on the material we looked at. But I would guess that the construction costs would be a little higher for the new equipment than modifications for the existing equipment. I may be wrong, but that would be a guess.

MR. GAWLAK: Could you be a little more specific as to why those costs would be higher?

DR. REIST: I mentioned earlier, you have heavier units, for example. The duct work and the modifications are sort of add-ons on the machines, on existing machines. Whereas with the new machines, you are changing your whole configuration of the machine layout. You may actually change the type of raw cotton feeding mechanism to the card which might make changes.

MR. GAWLAK: Dr. Reist, were you here for Mr. Hobin Holzits(?) testimony?

DR. REIST: No.

[2956] MR. GAWLAK: One of his points was that card rooms were very crowded and pre-separators and rotary tongue filters were extremely large and most of the room would be used up and they would have to be placed on the roof or in a separate facility. Taking this into account, would that change your estimate of the cost of construction for new equipment versus retrofitting old equipment?

DR. REIST: Yes, it would as a matter of fact. I hadn't thought of that before, but because you are making more space available, it ought to make that less expensive for new equipment.

* * * * *

[2999] [Prof. Burgess:] The question we are frequently asked is, "How long can one use a respirator?" I am marvelled by the standard when [3000] I look at the time period, I consider this question based upon seven year implementation plans. The acceptable wearing times, many of us have made statements. Breslin, who is with the AEC, has had a good deal of experience in the real world in respirator programs. I cite this in my statement. He feels that one hour is probably tops, and you should really hold respirator use to less than 20 minutes.

Bruce Hald, a chap at Lawrence Aviation Laboratory, who I believe has spoken before this body earlier, has suggested that one can't use a respirator for more than one or two hours. At that point one needs a break. I have worn a respirator a good deal in this study and I suggest that all of us who are involved in the issuance and the application of respirators do so. I feel that I personally can wear a respirator for about an hour, then my nose starts to, as well as other parts of my anatomy, really wants a break.

So we are talking here about statements from people in the field who have worked with respirators can effectively state that these devices are not suitable for continuous use. They are valuable when used on a intermittent basis, but I do not feel that it is suitable for continuous use.

* * * * *

[3010] MR. GAWLAK: Dr. Burgess, do you know of any industry where workers wear respirators a substantial amount of time?

PROF. BURGESS: Yes, may I give you a range?

MR. GAWLAK: Fine.

PROF. BURGESS: It is my understanding that in smelters in the West, the workers will wear respirators about 10% of their shift. In coal mines, we found that they could wear a respirator, possibly, 20% of their shift. On coke ovens, possible 25% of the shift. Therefore, I think this supports my earlier statement that they aren't suitable for continuous wearing. In all of these three applications, there are pulses of exposure. During those pulses of exposure, when engineering control has not been implemented, the respirators have been worn.

* * * * *

[3015] MR. DAVIS: My name is Frank Davis. I am from Local 1604 from Canton, Georgia for Canton Textile Mills. As you can evidently see, with the use of this respirator, you cannot hear yourself or anyone else over

machinery. It is like wearing a heater over you face. When you breathe, you rebreathe your hot air again before it can get out. And after [3016] just a few minutes, this filter here, which you can see is some kind of cotton, it is stopped up. It just cuts your breath off and it chokes you more than anything else. This is just like wearing a heater over your face.

After a few minutes of this, you are sweating so bad, you can't hardly wear it. You drown yourself. You know, you breathe in water and everything. You can't wear it with glasses. If you are like me, you have to wear your glasses or you can't see. These things, they don't seal. This kind, it seals pretty good but if you talk, your lower lip will come below this rubber ring here.

Now we had some paper types, you know, the single use respirators. We had some of those and somebody relieved me of my box when we checked out of the hotel. Anyhow, some of the single use are real good. You start sweating and then they will just kind of turn into a lump of lint then.

Others are made like an envelope. They are folded up with a long—and when you unfold them and put them on, they leave two big gaps at each jaw and one under your chin. That is just like not even wearing a respirator. I think you cannot be protected fully by a respirator. You can't wear them any length of time at all.

* * * * *

[3017] [Mr. Mabe:] It is required that I wear a face mask when working in the carding and drawing section, which is the type he mentioned and was aiming to show earlier. They are real uncomfortable. [3018] After you wear them in 80° temperature with 50% humidity for approximately two to three hours, under working conditions, they are wet from perspiration and practically as much dust as the type of card that we use at the present emits in the air. It takes about three hours for them to

almost block plum off until they look like you just picked them up out of a dust pile or out of the road where the traffic has been a running.

They are ill fitting. They have a metal piece across here which, if you wear glasses, they come up right across here. When you put them on, they fog your glasses up. In my job, working around machinery, it really makes it kind of hazardous because when my glasses fog up, as anyone who wears them will know, it is kind of hard to see what you are doing, expecially if your lighting situation isn't exactly favorable.

* * * * *

[3040] [Mr. Frumin:] Another major problem which Mr. Held has testified to, and Mr. Shutes and Mr. Burgess, is the problem of poor fit. And in that connection I would like to refer to Section 1910.34 of the existing Health and Safety Standards. I don't [3041] have that before me, so I can't quote the paragraph number, but in several cases, at several points in that standard, it refers to "the men"; for instance, in the area of training and supervision, I believe it says words to the effect that the men ought to be given an opportunity to try on various respirators.

I am not ascribing any prejudice to the authors of this standard. I am simply saying that it was written without any concern for women. And inasmuch as women will constitute a significant percentage of the workers who are going to have to wear respirators in the cotton textile industry, that oversight on the part of the authors of that standard is instructive.

Most respirators are not designed for women's faces. And anyone who believes that requiring the use of existing respirators by women, who believes that that requirement will protect workers, simply is uninformed.

Furthermore, even if proper fit is achieved and a worker manages to overcome the discomfort, the idea of a respirator on a worker who is already ill, who has

already suffered an impaired lung function, is a very cruel form of punishment to me, it seems to me.

* * * * *

[3043] Finally, the symptoms of byssinosis are not those—The initial symptoms are not those which lead workers to believe that it is a very serious problem. Of course, that is not the major reason workers don't understand that. They don't understand it because aside from what the union has told them, very few people have told them anything about it.

But the—When you go to work on Monday and the symptoms disappear by Monday afternoon or Tuesday morning, you figure, "Well, I will get used to it." I have heard that [3044] so many times; I couldn't count the number of times I have been told that by workers: "Why wear a respirator?" It requires proper administration of a program to see to it that workers are properly informed.

* * * * *

[1031] DR. MERCHANT: I think I addressed that point in terms of the objective of the study. We were looking not only at prevalence in various mill processes, but we were looking for the determinants of respiratory disease and we were interested in looking at a number of high dust areas.

* * * * *

In developing dose response curves, however, we did get a good distribution of the dust over a large variety of dust measurements and we did find striking dose response relation- [1032] ships.

EXHIBIT 62, ATTACHMENT II

ATMI ECONOMIC IMPACT STUDY
Estimated Temperature and Relative Humidity Compliance Cost (Dollars)

Dust Level MG/M3	Textile Process	Equipment Cost	Annual Maintenance Cost	Annual Energy Cost	Operating Brake Horse-Power
.2 VE	Opening	11,645,665	221,824	689,103	9,212
.2	Picking	19,803,067	500,603	1,516,019	19,748
.2	Carding	51,818,179	1,343,577	4,545,772	59,914
.2	Sub-total	83,266,911	2,066,004	6,750,894	88,874
.2	Drawing	32,480,565	770,551	2,322,307	30,077
.2	Combing	5,560,851	126,895	381,899	4,934
.2	Roving	25,595,645	624,524	2,042,940	24,456
.2	Opening-Roving Sub-total	146,903,972	3,587,974	11,498,040	148,341
.5	Spinning	4,286,350	143,698	209,323	4,278
.5	Twisting				
.5	Winding	5,283,507	164,371	210,252	4,297
.5	Spooling	1,210,988	33,890	43,303	885
.5	Warping	—	—	—	—
.5	Spinning-Warping Sub-total	10,780,845	341,959	462,878	9,460
1.0	Slashing				
1.0	Weaving	24,098,472	723,621	1,984,909	28,306
	TOTAL:	181,783,289	4,653,554	13,945,827	186,107

NOTE:

Same notes on ATTACHMENT I apply to ATTACHMENT II

[Notes reprinted in Pet. App. at 156.]

IV. ORDER OF SUPREME COURT GRANTING PETITIONS FOR WRITS OF CERTIORARI IN NOS. 79-1429 AND 79-1583

[Order of the Supreme Court of the United States filed October 6, 1980]

79-1429

AM. TEXTILE MFGRS. INST.

v.

MARSHALL, SEC. LABOR, ET AL.

79-1583

NATL. COTTON COUNCIL, ETC.

v.

MARSHALL, SEC. LABOR, ET AL.

The petition for a writ of certiorari in No. 79-1429 is granted limited to Questions 1, 2 and 4 presented by the petition. The petition for a writ of certiorari in No. 79-1583 is granted. The cases are consolidated and a total of one hour is allotted for oral argument.

PREVIOUS PAGE WAS BLANK

Supreme Court, U.S.
FILED
JUL 31 1980
MICHAEL RODAK, JR., CLERK

Nos. 79-1429, 79-1583, and 79-1789

In the Supreme Court of the United States

OCTOBER TERM, 1979

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR

COTTON WAREHOUSE ASSOCIATION, ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.

ON PETITIONS FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENTS

WADE H. McCREE, JR.
Solicitor General
Department of Justice
Washington, D.C. 20530
(202) 633-2217

CARIN ANN CLAUSS
Solicitor of Labor

BENJAMIN W. MINTZ
Associate Solicitor

ALLEN H. FELDMAN
JOHN A. BRYSON
Attorneys
Department of Labor
Washington, D.C. 20201

In the Supreme Court of the United States

OCTOBER TERM, 1979

No. 79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR

No. 79-1583

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR

No. 79-1789

COTTON WAREHOUSE ASSOCIATION, ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.

ON PETITIONS FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENTS

QUESTIONS PRESENTED

1. Whether the cotton-dust occupational health standard set by the Secretary of Labor is "feasible" within the meaning of 29 U.S.C. 655(b)(5) and "reasonably necessary or appropriate to provide safe or healthful employment and places of employment" within the meaning of 29 U.S.C. 652(8).

2. Whether the medical-transfer and income-protection provision of the cotton-dust standard is "reasonably necessary or appropriate to provide safe or healthful employment and places of employment" within the meaning of 29 U.S.C. 652(8).

3. Whether substantial evidence supports the Secretary's determination that employees exposed to cotton dust in cotton warehouses and cotton-classing offices may suffer material impairment of health.

TABLE OF CONTENTS

Page

Opinions below 1

Jurisdiction 1

Statement 1

Discussion 4

Conclusion 10

TABLE OF AUTHORITIES

Cases:

American Iron & Steel Institute v. *OSHA*, cert. granted, No. 78-919 (July 2, 1980) 5, 11

Industrial Union Dep't, AFL-CIO v. *American Petroleum Institute*, No. 78-911 (July 2, 1980) 2, 4, 5, 11

Lawn v. *United States*, 355 U.S. 339 ..... 5, 9

Republic Steel Corp v. *OSHA*, cert. granted, No. 78-918 (July 2, 1980) 5, 10

Whirlpool Corp. v. *Marshall*, No. 78-1870 (Feb. 26, 1980) 8, 9

Statutes, regulation and rule:

Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.* 1

29 U.S.C. 652(8) 7

29 U.S.C. 653(b)(4) 9, 10

Page

Statutes, regulation and rule—Continued:

29 U.S.C. 655(a) 2
29 U.S.C. 655(b) 1
29 U.S.C. 655(b)(5) 4, 7, 8
29 U.S.C. 655(f) 1, 5
41 U.S.C. 35(e) 2
29 C.F.R. 1910.1043(f)(2)(v) 4, 6, 8, 9
Rule 13(d), Gen. R. D.C. Cir. 10

Miscellaneous:

41 Fed. Reg. (1976):
pp. 56498-56527 3
p. 56503 3
pp. 56503-56505 5
pp. 56503-56508 3
pp. 56504-56508 3
pp. 56505-56506 3
43 Fed. Reg. (1978):
pp. 27350-27380 4
pp. 27350-27399 ..... 1, 4
p. 27351 2
p. 27352 2
pp. 27352-27361, 27379 5
p. 27355 ..... 2, 3
p. 27358 5

Page

Miscellaneous—Continued:

43 Fed. Reg. (1978):

p. 27387 ..... 7, 8

pp. 28473-28474 1

pp. 35032-35035 1

pp. 56893-56894 1

45 Fed. Reg. 50328-50329 (1980) 10

S. Rep. No. 91-1282, 91st Cong., 2d Sess. (1970) (*reprinted in* Senate Comm. on Labor and Public Welfare, *Legislative History of the Occupational Safety and Health Act of 1970* (Comm. Print 1971)) 2, 8, 9

OPINIONS BELOW

The opinion of the court of appeals (Pet. App. 19-102)[1] is reported at 617 F. 2d 636. The Secretary of Labor's standard for occupational exposure to cotton dust and statement of reasons in support of the regulation appear at 43 Fed. Reg. 27350-27399 (1978), as amended at 43 Fed. Reg. 28473-28474 (1978), 43 Fed. Reg. 35032-35035 (1978) and 43 Fed. Reg. 56893-56894 (1978).

JURISDICTION

The judgment of the court of appeals was entered on October 24, 1979, and petitions for rehearing were denied on January 11, 1980 (Pet. App. 103). The petition for a writ of certiorari in No. 79-1429 was filed on March 14, 1980, and the petition in No. 79-1583 was filed on April 9, 1980. On April 2, 1980, the Chief Justice extended the time within which the Cotton Warehouse Association and the American Cotton Shippers Association could file a petition to May 10, 1980, and the petition (No. 79-1789) was filed on May 9, 1980. The jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT

The Occupational Safety and Health Act of 1970 (OSHA), 29 U.S.C. 651 *et seq.*, authorizes the Secretary of Labor to establish, after notice and opportunity to comment, nation-wide, mandatory standards governing health and safety in the workplace. 29 U.S.C. 655(b). On June 19, 1978, the Secretary issued an OSHA standard limiting occupational exposure to cotton dust. 43 Fed. Reg. 27350-27399, 28473-28474, 35032-35035, 56893-56894 (1978). Pursuant to 29 U.S.C. 655(f), petitioners

---

[1] "Pet. App." refers to the separately bound appendix to the petition in No. 79-1429.

challenged the standard on various grounds in the court of appeals. On October 24, 1979, the court upheld the standard in all but one respect (Pet. App. 19-102).

The background of the cotton-dust standard is explained in the opinion of the court of appeals (Pet. App. 29-38). Briefly, exposure to cotton dust induces a "constellation of respiratory effects" known as "byssinosis" or "brown lung disease" (43 Fed. Reg. 27352 (1978)) and was one of the expressly-recognized health evils that provoked passage of the Act. S. Rep. No. 91-1282, 91st Cong., 2d Sess. 3 (1970) (*reprinted in* Senate Comm. on Labor and Public Welfare, *Legislative History of the Occupational Safety and Health Act of 1970*, at 143 (Comm. Print 1971) ("*Leg. Hist.*")). See *Industrial Union Dep't, AFL-CIO* v. *American Petroleum Institute,* No. 78-911 (July 2, 1980), slip op. 35-36.

Exposure to cotton dust was not regulated in the United States until 1968. The American Conference of Governmental Industrial Hygienists recommended in 1966 that exposure be limited to 1000 ug/m^3 (1000 micrograms per cubic meter) of total dust averaged over an eight-hour day.[2] The Secretary of Labor adopted that limitation in 1968 as an occupational health requirement for public contractors under the Walsh-Healey Act. 43 Fed. Reg. 27351 (1978); see 41 U.S.C. 35(e). In 1971, the Secretary made this "established Federal standard" an occupational health standard for all covered employers pursuant to 29 U.S.C. 655(a).

---

[2]This measure of dust concentrations includes both the respirable and nonrespirable fractions. The Secretary, in keeping with the current state of scientific opinion, keyed the new standard to exposure to the respirable fraction of the dust. 43 Fed. Reg. 27355 (1978).

In 1976, the Secretary proposed to reduce the 1000 ug/m^3 total dust standard to a 200 ug/m^3 respirable dust level in all operations. 41 Fed. Reg. 56498-56527 (1976); J.A. 170-200.[3] Numerous studies established that the prevalence of the disease was linearly related to the ambient air dust levels. For textiles, in particular, the exhaustive work of Dr. James Merchant developed a dose-response relationship for cotton-dust induced disease which showed that significant risk existed even at dust levels approaching zero. 43 Fed. Reg. 27355 (1978); J.A. 235-246, 256-263, 351-360, 361-369, 1492-1840. Nontextile industries were included within the scope of the proposed regulation based on the repeated observation of similar health effects on employees who handle the same material as textile workers. 41 Fed. Reg. 56503 (1976).

The Secretary proposed that reductions in dust levels be achieved through engineering controls such as ventilation. The Secretary maintained that individual respirators had proven too unreliable to provide effective long-term protection and that reliance on transfer of employees found to be at risk by a medical surveillance program was not practicable in view of the paucity of risk-free job assignments in the textile industry. 41 Fed. Reg. 56503-56508 (1976). The Secretary tentatively identified the lowest feasible level as 200 ug/m^3 in all operations and proposed to require that goal to be met by engineering controls in stages over a period of seven years. 41 Fed. Reg. 56505-56506 (1976). In the interim, the Secretary proposed reliance on respirators, a medical surveillance program, specified work practices to minimize exposure, and employee education and training. 41 Fed. Reg. 56504-56508 (1976). This proposal was followed by a series of

---

[3] "J.A." refers to the joint appendix in the court of appeals.

public hearings and an extended period for the submission of written data, comments and other evidence, eventually producing a record exceeding 105,000 pages (Pet. App. 35).

The Secretary issued the final standard with his findings and explanation in June 1978. 43 Fed. Reg. 27350-27399 (1978). The standard requires textile employers to achieve a 200 ug/m^3 dust level to be met within four years, with the exception of slashing and weaving operations. For those processes, the Secretary raised the level to 750 ug/m^3, largely for technological and economic reasons. 43 Fed. Reg. 27350-27380 (1978). For nontextile industries, the Secretary set a dust level of 500 ug/m^3. The standard also requires employee exposure monitoring, medical surveillance, work practices, respirators, training and warning signs. In addition, the standard includes a medical-transfer and income-protection provision (29 C.F.R. 1910.1043(f)(2)(v)) requiring that, where certain levels of exposure are exceeded, an employee certified by a physician as unable to wear a respirator may transfer without loss of pay to any other position in the company that is available and that enjoys an exposure level below the designated level.

DISCUSSION

1. Petitioners in No. 79-1429 (Pet. 14-19) and petitioner National Cotton Council of America (Pet. 8-14) contend that the Court should grant review in this case in order to consider the meaning of the term "feasible," as used in 29 U.S.C. 655(b)(5), and to determine whether the Secretary, in issuing an OSHA standard, must establish that the costs of the standard bear a "reasonable relationship" to its benefits. These issues were presented but not decided by the Court in *Industrial Union Dep't, AFL-CIO* v. *American Petroleum Institute, Inc.*, No. 78-911 (July 2, 1980), slip op. 5, 29 (plurality opinion). These issues are

again presented, however, in *Republic Steel Corp.* v. *OSHA,* cert. granted, No. 78-918 (July 2, 1980), and *American Iron and Steel Institute* v. *OSHA,* cert. granted, No. 78-919 (July 2, 1980), which concern the OSHA standard for exposure to coke-oven emissions. See *Industrial Union Dep't, AFL-CIO* v. *American Petroleum Institute, supra,* slip op. 46 n.64 (plurality opinion) (significance test satisfied in findings made for coke-ovens standard). Accordingly, the petitions for a writ of certiorari in No. 79-1429 and No. 79-1583 should be held pending the disposition of those cases.[4]

---

[4]We do not read the textile industry's petition as raising any challenge to the extent of the health risk from exposure to cotton dust. In any event, the Secretary made findings concerning the cotton-dust standard that satisfy the "significance" test announced in *American Petroleum Institute.* To begin with, even the plurality in *American Petroleum Institute* recognized (slip op. 35-36) that exposure to cotton dust was a "significant" health problem within the meaning of the test and was, in fact, one of the expressly-recognized occupational health evils that prompted passage of the Act. In addition, the Secretary found that the available evidence demonstrated that a significant number of cases of byssinosis could be avoided by implementation of the standard. See 41 Fed. Reg. 56503-56505 (1976) (findings on which initial proposal made) and 43 Fed. Reg. 27352-27361, 27379 (1978) (findings accompanying final standard). For example, in the preamble to the final standard, the Secretary found that certain studies make it "clear * * * that cotton dust produce[s] significant health effects at low levels of exposure." 43 Fed. Reg. 27358 (1978). These findings are amply supported by the epidemiological studies of Dr. Merchant and others. Accordingly, there is no need for further review of the "significant risk" issue in this case.

Moreover, this case is not appropriate for review of the meaning of the term "feasible," aside from the question of whether that term mandates a cost-benefit analysis. In the court of appeals, petitioners merely disputed the application of the "feasibility" test to this particular record. Accordingly, the court of appeals, having decided the cost-benefit issue adversely to petitioners, dealt with the feasibility issue on routine substantial evidence grounds (Pet. App. 67-69). Petitioners presented no attack on the Secretary's test for feasibility

2. Petitioners in No. 79-1429 contend (Pet. 20-25) that the court of appeals failed to apply the substantial evidence standard of review provided in 29 U.S.C. 655(f) and instead insisted only that the agency adequately articulate its reasoning and findings. This error, petitioners state (Pet. 22), stems from a so-called "Bazelon heterodoxy" that "has been developed in several concurring opinions of Judge Bazelon * * *." Because Judge Bazelon is the author of the court of appeals' opinion in this case, petitioners surmise that the court's result was influenced by the views expressed in those earlier concurring opinions.

There is no warrant in the record for petitioners' assertion that the court of appeals ignored its statutory obligations. To the contrary, the court's detailed discussion indicates that it was faithful to the substantial evidence test in this case. See Pet. App. 39-40, 43, 44, 61. The court observed that "[t]he substantial evidence test provides for more rigorous scrutiny than the usual 'arbitrary and capricious' test applicable to informal rulemaking" (*id.* at 39) and that "the reviewing court's task under the Act is to provide a careful check on the agency's determinations without substituting its judgment for that of the agency" (*id.* at 40). As an example of the court's "careful check," it scrutinized closely the accuracy of the Secretary's cost estimate for the cotton-dust standard (*id.* at 62-67). Indeed, the court held that the Secretary had not established the economic feasibility of

---

other than that it failed to include a cost-benefit analysis. Nor did petitioners ever suggest that the Secretary's test would present a constitutional question regarding the delegation of legislative authority. Hence, petitioners have not preserved these objections for review. See *Lawn* v. *United States*, 355 U.S. 339, 362-363 n.16 (1958).

the standard as applied to cottonseed oil mills (*id.* at 86-93). In short, there is no merit to petitioner's assertion that the court did no more in this case than require the agency to articulate its reasoning.

3. Petitioners in No. 79-1429 claim (Pet. 25-29) that the Secretary exceeded his authority in including a medical-transfer and income-protection provision in the cotton-dust standard. 29 C.F.R. 1910.1043(f)(2)(v) provides that when a physician determines that an employee is unable to wear a respirator, the employee must be given an opportunity to transfer to another position having a dust level at or below the permissible exposure limit, if one is available, without loss of earnings or other employment rights (Pet. App. 8-9). The court of appeals correctly held (Pet. App. 95-98) that this provision is within the Secretary's authority under 29 U.S.C. 652(8) and 655(b)(5). No conflict in the circuits exists on this issue, and further review is therefore unwarranted.

The Secretary determined that it would take several years in some industries to phase in the required engineering controls to implement the cotton-dust standard and that during the interim employees should be equipped with respirators to avoid breathing air contaminated beyond the designated levels. However, the Secretary also determined that some employees are physically unable to wear respirators due to facial structure, severe discomfort, or impaired breathing capacity (43 Fed. Reg. 27387 (1978)). All parties to the rulemaking proceeding agreed that such employees should be transferred to another job station having little or no dust exposure (J.A. 1461, 2037, 2562, 2582-2583, 3351). However, experience under OSHA has shown that employees have a history of denying or minimizing work-related health problems for fear of being discharged or

transferred to lower paying jobs (J.A. 2121, 2123, 2126-2127, 2153-2154, 2579-2582). The Secretary found that "under such circumstances, in the absence of some opportunity to transfer to a position where a respirator need not be worn, [the employee] might very well be discharged, or otherwise sustain economic loss, due to his or her inability to wear a respirator." 43 Fed. Reg. 27387 (1978). Alternatively, the employee might be forced by economic circumstances to suffer continuing exposure to impermissibly high dust levels.

The Secretary is authorized by the Act to require "practices, means, methods, operations, or processes [that are] reasonably necessary or appropriate to provide safe or healthful employment" (29 U.S.C. 652(8)) and is given a mandate to ensure that "no employee will suffer material impairment of health or functional capacity" on the job (29 U.S.C. 655(b)(5)). The medical-transfer and income-protection provision is such a "practice," "means," or "method." The Secretary has determined, on the basis of substantial evidence, that exposure to cotton dust above certain levels is unsafe. Consequently, he has simply assured that employees unable to wear respirators will not have a disincentive to forego a transfer from a job in dangerously contaminated air, at least when they can perform other work "which is available or which later becomes available" (29 C.F.R. 1910.1043(f)(2)(v)) in safe areas of the plant.

To allow transfers without income protection would mean that the employee, not the employer, would bear the cost of ensuring occupational health and safety—contrary to Congress's express intent. See *Leg. Hist.* 144, 444, 854, 1150-1151; 43 Fed. Reg. 27387 (1978). 29 C.F.R. 1910.1043(f)(2)(v) clearly advances the purpose of the Act and is consistent with its legislative history. Hence, even though the statute does not expressly refer to medical

transfers, "when it is remembered that safety legislation is to be liberally construed to effectuate the congressional purpose," the provision is within the Secretary's broad statutory authority. *Whirlpool Corp.* v. *Marshall,* No. 78-1870 (Feb. 26, 1980), slip op. 11.[5]

Contrary to petitioners' contention (79-1429 Pet. 27-28), the challenged provision does not conflict with the Court's recent construction of the Act in *Whirlpool.* The congressional concern with the so-called "strike-with-pay" regulation discussed in *Whirlpool* centered on avoiding endless disputes over compensating employees for *not* working. See *Leg. Hist.* 416. As the Court observed in *Whirlpool* (slip op. 16), "[w]hen it rejected the 'strike with pay' concept * * * Congress very clearly meant to reject a law unconditionally imposing upon employers an obligation to continue to pay their employees their regular pay checks when they absented themselves from work for reasons of safety."

The provision at issue here stands in sharp contrast. Rather than enabling an employee to refuse to do any work and still be paid, the medical-transfer and income-protection provision only requires a transfer to do other work, and then only if such a position is available. Furthermore, the transfer provision may not be invoked by an employee unilaterally. Before a medical transfer may be obtained, a physician must determine that the employee cannot wear a respirator. The concerns of Congress as expressed in the legislative history of the Act and so discerned by this Court in *Whirlpool* are not at

---

[5]Moreover, as the court of appeals remarked (Pet. App. 98), "[e]mployers will be burdened for only a short time by the medical transfer and wage guarantee provisions. Once employers achieve the requisite exposure levels, no employees, to be protected, will need respirators or job transfers."

odds with this reasonable, limited means of protecting employees' health.[6]

4. Petitioners in No. 79-1789 contend (Pet. 9-11) that there is insufficient evidence to support the Secretary's determination that employees exposed to cotton dust in cotton warehouses and cotton-classing offices may suffer a material impairment of health. There is no need for the Court to consider this issue at this time.

In light of this Court's decision in *Industrial Union Dep't, AFL-CIO* v. *American Petroleum Institute, supra,* the Secretary has decided to re-examine and reconsider the cotton-dust standard as it applies to these two non-textile industries. See 45 Fed. Reg. 50328-50329 (July 29, 1980). At the same time, the Secretary has suspended the effectiveness of the standard for these industries pending

---

[6]Petitioners also contend (79-1429 Pet. 28-29) that the medical-transfer and income-protection provision supersedes or otherwise affects workmen's compensation laws in contravention of Section 4(b)(4) of the Act, 29 U.S.C. 653(b)(4). This claim, which was not raised below (see *Lawn* v. *United States,* 355 U.S. 339, 362-363 n.16 (1958)), is without merit. Section 4(b)(4) is simply a general expression of congressional intent that the Act not be construed to preempt workmen's compensation or other employment-liability laws. The cotton-dust standard does not make the inability to wear a respirator compensable or affect the amount of any compensation award. Those officials who administer or apply compensation laws retain the authority to determine whether an employee is entitled to compensation and, if so, what amount the award should be. In addition, the employer's obligation under 29 C.F.R. 1910.1043(f)(2)(v) is only to assure that an employee "suffers no loss of earnings * * *." Accordingly, if an employee receives a compensation award because of a condition that also merits a transfer, any employer payment under this provision would be offset by the amount of the award and would not be in addition to the award. Hence, this provision, no more or less than any other provision of the standard, affects workmen's compensation laws only by preventing disease. But that is precisely the purpose of the Act. Section 4(b)(4) thus cannot be read in the bizarre fashion suggested by petitioners.

this re-examination. We therefore submit that the petition for a writ of certiorari in No. 79-1789 should be granted and that the portion of the case challenging application of the standard to cotton warehouses and cotton-classing offices be remanded to the court of appeals so that the record may be returned to the agency for further consideration. See Rule 13(d), Gen. R. D.C. Cir.

CONCLUSION

The petitions for a writ of certiorari in Nos. 79-1429 and 79-1583 should be held pending disposition of *Republic Steel Corporation* v. *OSHA*, No. 78-918, and *American Iron and Steel Institute* v. *OSHA*, No. 78-919. The petition for a writ of certiorari in No. 79-1789 should be granted and the case remanded, insofar as it concerns application of the cotton-dust standard to cotton warehouses and cotton-classing offices, in order to allow the Secretary to reconsider that portion of the standard in light of *Industrial Union Dep't, AFL-CIO* v. *American Petroleum Institute*, No. 78-911 (July 2, 1980).

Respectfully submitted.

WADE H. MCCREE, JR.
Solicitor General

CARIN ANN CLAUSS
Solicitor of Labor

BENJAMIN W. MINTZ
Associate Solicitor

ALLEN H. FELDMAN
JOHN A. BRYSON
Attorneys
Department of Labor

JULY 1980

DOJ-1980-07

Supreme Court, U. S.
FILED
AUG 14 1980
MICHAEL RODAK, JR., CLERK

No. 79-1429

IN THE

Supreme Court of the United States

OCTOBER TERM 1979

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

SUPPLEMENT TO PETITION FOR A WRIT OF CERTIORARI AND REPLY TO BRIEF FOR THE FEDERAL RESPONDENTS

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511
Counsel for American Textile Manufacturers Institute, Inc.

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART & EDWARDS
3920 First National Bank Tower
Atlanta, Georgia 30303
Counsel for American Textile Manufacturers Institute, Inc.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, Virginia 23219
Counsel for American Textile Manufacturers Institute, Inc.
and for
Fieldcrest Mills, Inc.

(Counsel list continued on inside cover)

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Milliken and Company

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S.C. 29304
Counsel for Arkwright Mills

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S. C. 29304
Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Blair Mills, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
Counsel for Hermitage, Inc.

ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541
Counsel for Dan River, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
Baker & Hostetler
818 Connecticut Avenue, N.W.
Washington, D. C. 20006
Counsel for Cone Mills Corporation

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
1201 Maple Street
Greensboro, N. C. 27405
Counsel for Cone Mills Corporation

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
Counsel for Mayfair Mills

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S. C. 29715
Counsel for Springs Mills, Inc.

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
Constangy, Brooks & Smith
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303
Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, Georgia 31833
Counsel for West Point-Pepperell, Inc.

TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES i

DISCUSSION 1

CONCLUSION 8

TABLE OF AUTHORITIES

Cases

American Iron and Steel Institute v. *OSHA, cert. granted,* No. 78-912 (July 2, 1980) 1, 2, 4, 8

Industrial Union Dept. AFL-CIO v. *American Petroleum Institute, Inc.,* No. 78-911, 48 U.S.L.W. 5022 (July 2, 1980) . . 2, 3, 5

Republic Steel Corp. v. *OSHA, cert. granted,* No. 78-918 (July 2, 1980) 1

SEC v. *Chenery Corp.,* 332 U.S. 194 (1947) 7

Whirlpool Corp. v. *Marshall,* 48 U.S.L.W. 4189 (Feb. 26. 1980) 7, 8

Statutory Provisions

Occupational Safety and Health Act, 29 U.S.C. §§ 651 *et seq.*

29 U.S.C. § 652(8) 3

29 U.S.C. § 653(b)(4) 8

29 U.S.C. § 655(b)(5) 5

Other Authorities

41 Fed. Reg. 56505 (1976) 3

43 Fed. Reg. 27359 (1978) 4

43 Fed. Reg. 27387 (1978) 7

43 Fed. Reg. 53007 (1978) 8

IN THE

Supreme Court of the United States

OCTOBER TERM 1979

No. 79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

SUPPLEMENT TO PETITION FOR A WRIT OF CERTIORARI AND REPLY TO BRIEF FOR THE FEDERAL RESPONDENTS

The Government argues that the petition filed by the textile industry in this case should be held pending disposition of *Republic Steel Corp.* v. *OSHA, cert. granted,* No. 78-918 (July 2, 1980) and *American Iron and Steel Institute* v. *OSHA, cert. granted,* No. 78-919 (July 2, 1980) (*Coke Ovens*).[1] The Government's contention is without merit because this case presents several issues not presented in *Coke Ovens.* Moreover, particularly in light of the recent

[1] Brief for the Federal Respondents (Government's Brief), p. 5.

decision in *Industrial Union Dept. AFL-CIO* v. *American Petroleum Institute, Inc.*, No. 78-911, 48 U.S.L.W. 5022 (July 2, 1980) (*Benzene*), review in this case will complement review in *Coke Ovens* and will provide the opportunity for comprehensive determination of OSHA's regulatory authority under the Occupational Safety and Health Act of 1970 (the Act).

Coke Ovens presents two issues: (i) whether OSHA's finding of technological feasibility must be supported by substantial evidence; and (ii) whether OSHA must show that the standard it selected provides measurable health benefits that bear a reasonable relationship to the costs of the standard.[2] While this case presents the issue whether a reasonable relationship must be shown between costs and benefits, it provides a more complete context for resolution of this issue than does *Coke Ovens*.

Though *Coke Ovens* presents the issue whether OSHA must strike a balance between costs and benefits, it does not question the nature of benefits necessary to achieve a balance. On the other hand, this case does present the question whether OSHA can demonstrate a balance between costs and benefits if comparable protection against material impairment of health may be achieved with a far less expensive standard.[3]

In addition, this case presents four issues not presented in *Coke Ovens*. These four issues will require decision without regard to whether the Court holds that OSHA must

---

[2] *See* Petition For Writ Of Certiorari To The United States Court Of Appeals For The Third Circuit filed by American Iron and Steel Institute in No. 78-919.

[3] The Government incorrectly contends that the textile industry petition raises no challenge to the extent of health risk from cotton dust exposure. Government's Brief, p. 5, n. 4. To the contrary, the Petition directly raised the argument that the nature and extent of health risk from cotton dust make effective a less expensive alterna-

demonstrate a reasonable relationship between costs and benefits to establish feasibility of its standards.

1. Wholly apart from the question of a balance of costs and benefits, petitioners submit that OSHA cannot justify an unnecessarily expensive standard as "reasonably necessary or appropriate" within the meaning of Section 3(8) of the Act, 29 U.S.C. § 652(8). The plurality opinion in *Benzene* held that in order to establish a standard as "reasonably necessary or appropriate," OSHA must make a threshold finding that a significant risk of material impairment of health exists with respect to a toxic substance.[4] In *Benzene* OSHA did not meet this threshold requirement because it assumed rather than proved that there is "no safe level" for benzene exposure and that the standard should set the exposure limit at the "lowest feasible" level.[5]

Unless the Court holds that OSHA's obligation to respond only to significant risk of material impairment ends when it crosses the threshold, precisely the same analysis that invalidated the Benzene Standard also invalidates the Cotton Dust Standard. This is so because OSHA applied its automatic "lowest feasible" policy to cotton dust[6] and thereby foreclosed consideration of a far less expensive alternative that would provide protection against material impairment of health comparable to the more stringent standard OSHA chose.[7]

---

tive to OSHA's automatic "lowest feasible" approach. Petition, p. 9. Moreover, the nature and extent of health risk is a vital part of the questions whether a reasonable relationship between costs and benefits should be required and whether it has been shown to exist.

[4] Slip Opinion, p. 29, 48 U.S.L.W. at 5030.

[5] OSHA derived its assumption from its policy for all carcinogens: "Given OSHA's cancer policy, it was in fact irrelevant whether there was any evidence at all of a leukemia risk. . . ." Slip Opinion, p. 14, 48 U.S.L.W. at 5026.

[6] 41 Fed. Reg. 56505 (1976).

[7] This alternative recommended by industry proposed more mod-

The alternative was based on the critical facts that distinguish regulation of cotton dust from all previous OSHA health regulation. First, cotton dust is not a carcinogen.[8] Second, the health condition, byssinosis, is detectible when it is mild and reversible, years before any disability or permanent impairment might result.[9] However, OSHA refused to depart from its cancer policy even though OSHA admitted that medical surveillance could effectively prevent the serious, irreversible stages of byssinosis,[10] and even though OSHA never found that the mild and reversible stages of byssinosis constitute material impairment.[11]

2. This case presents the issue whether, in order to establish feasibility, OSHA must meet specific criteria[12] about the accuracy of its cost estimate and the effect on industry of bearing those costs. This question cannot be resolved in *Coke Ovens* because in that case petitioners do not challenge OSHA's cost estimate or its assessment of impact on industry and the public.

In *Benzene,* the Court decided that the Act must be construed to provide criteria as to the benefit side of the

---

erate and affordable exposure limits than those adopted by OSHA. The keystone of the alternative program would be medical surveillance to identify employees with early, mild and reversible symptoms. Those exhibiting early symptoms would be protected from further risk by selective respiratory use or transfer to low exposure areas, as medically appropriate for the individual. Petition, p. 9.

[8] Appendix to Petition in No. 79-1429 (App.), p. 36, n. 35.

[9] Ex. 6, No. 34, p. 321 (Joint Appendix to the Court of Appeals, hereinafter J.A., 347); Ex. 6, No. 56, p. 26 (J.A. 384).

[10] 43 Fed. Reg. 27359 (1978).

[11] While OSHA termed the early effects "significant," it did not make the crucial finding of material impairment. 43 Fed. Reg. 27354 (1978). Indeed, it could not have done so properly since the early stage of byssinosis does not impair or disable an individual at all. Martin Tr. 1779 (J.A. 3741), Statement of Jack Whitworth, Ex. 42, p. 6 (J.A. 1992).

[12] Appropriate criteria are suggested in Petition, p. 17.

regulatory equation, *i.e.*, what health risks may be regulated. The petition here raises precisely the same issue as to the other side of the equation, the cost or feasibility side of the Act.

The decision in *Benzene* provides strong support for petitioners' position that OSHA must meet specific criteria to establish its standards as feasible within the meaning of Section 6(b)(5) of the Act.[13] In *Benzene*, a majority of the Court indicated that unless the statutory terms "reasonably necessary or appropriate" and "feasible" are construed to provide meaningful guidance about the bounds of OSHA's rulemaking authority, the Act may be an open-ended grant of power constituting an unconstitutional delegation of legislative authority.[14]

In this case, OSHA argued and the court below held that an OSHA standard is economically feasible so long as it alone does not destroy the entire industry.[15] This is an open-ended grant at least as unconfined as that which the plurality in *Benzene* found to require a limiting construction. This case is an appropriate vehicle for enunciation of criteria which will give substance to the statutory limitations on that grant.

Moreover, wholly aside from the need to give substance to the statutory limitations on OSHA's authority, OSHA cannot satisfy even the most lenient test for feasibility without fulfilling some specific criteria. Thus OSHA has no basis to conclude that a standard will not cripple or destroy an industry unless OSHA has both a reliable cost estimate and reliable evidence, not assumptions, to show that industry can absorb the costs or pass them on. OSHA did

---

[13] 29 U.S.C. § 655(b)(5).

[14] Slip Opinion, p. 35, 48 U.S.L.W. at 5032; *See also* concurring opinion of Rehnquist, J., 48 U.S.L.W at 5042.

[15] App. 67, 69.

not have reliable evidence on either point when it promulgated the Cotton Dust Standard.

3. This case presents the issue whether a court providing judicial review under the substantial evidence test may, as the court below did, confine its review to the adequacy of the agency's articulation of its statement of reasons, without testing the reliability of the agency's findings. The Government contends that the court below provided full review and that petitioners merely "surmised" that the court applied the truncated review known as the 'Bazelon heterodoxy'.[16] On the contrary, it is the opinion below that announces this syntactical review as the controlling approach to review.[17]

For example, the decision below allowed OSHA to assume, against all evidence, that all of the technology necessary to meet its standard could be created and installed in four years.[18] Moreover, the court allowed OSHA to use as the cost estimate for its stringent standard industry's estimate for a far less stringent standard. In doing so, the court's only supporting citation for the crucial proposition that industry's measures and an unspecified "little more" would meet OSHA's stringent standard was the *post hoc* rationalization of counsel.[19] If the court below had given the kind of full substantial evidence review given by this Court in *Benzene*, it would have found that OSHA never made the crucial finding attributed to it by counsel.

---

[16] Government's Brief, p. 6.

[17] App. 45, n. 66, citing Ethyl Corp. v. EPA, 541 F.2d 1, 67 (D.C. Cir. 1976) (Bazelon, C. J., McGowan, J., concurring); Internat'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 652 (D.C. Cir. 1973) (Bazelon, C. J., concurring in result); *See* Petition, pp. 20-25.

[18] *See* Petition, pp. 12-13.

[19] App. 65, n. 136. It is well settled that "The courts may not accept appellate counsel's *post hoc* rationalizations for agency action. . . ." SEC v. Chenery Corp., 332 U.S. 194, 196 (1947).

There can be few issues more important to the application of the Act than the level of review required of the courts of appeals. This case presents this issue squarely and provides an appropriate occasion for its resolution.

4. This case presents the issue whether OSHA may properly depart from the safety and health field to regulate the economic relationship in the workplace by imposing wage guarantees such as that in the Cotton Dust Standard. The Government advances two reasons to justify the wage guarantee provision: (i) the wage guarantee provision is a limited provision designed to aid worker health; and (ii) the provision does not conflict with congressional intent as interpreted in *Whirlpool Corp.* v. *Marshall,* 48 U.S.L.W. 4189 (Feb. 26, 1980) and as expressed in Section 4(b)(4) of the Act.[20] Neither contention withstands scrutiny.

Contrary to the Government's contention that OSHA imposed wage guarantees for health reasons, OSHA itself stated clearly that the goal of the provision was to remove adverse economic impact, not health effects.[21] Moreover, the Government's claim that the wage guarantee provision is a "limited" provision ignores the fact that OSHA apparently intends to engage in extensive regulation of the economic relationship between employer and employee. OSHA has foretold this by already promulgating an extremely broad wage guarantee provision in its lead standard.[22]

In addition, the wage guarantee provision conflicts directly with congressional intent. The overriding congressional intent expressed by Congress' rejection of the "strike with pay" provision is that employers should not be forced to pay normal wages to employees who, for safety reasons,

---

[20] Government's Brief, pp. 7-10.

[21] 43 Fed. Reg. 27387 (1978). *See* Petition, pp. 25-26.

[22] 43 Fed. Reg. 53007 (1978).

are not performing their normal jobs. *See Whirlpool Corp.* v. *Marshall, supra,* 48 U.S.L.W. at 4193-94. Yet the wage guarantee provision forces employers to do precisely that. Indeed, with exactly the same rationale that the Government advances to support the cotton dust wage guarantees, OSHA could promulgate a full blown strike with pay provision. Petitioners respectfully ask the Court to confirm that it is beyond OSHA's authority to promulgate either provision.[23]

CONCLUSION

Because this case presents important issues complementary to and separate from those in *Coke Ovens,* the Petition For A Writ Of Certiorari should be granted at this time. If the Petition is granted, petitioners suggest that the Court may wish to consider scheduling the case for argument on the same day as *Coke Ovens.*

Respectfully submitted,

AMERICAN TEXTILE
MANUFACTURERS
INSTITUTE, INC.

[23] The Government's claim that wage guarantee provisions do not supersede or affect state workman's compensation statutes in violation of Section 4(b)(4) of the Act, 29 U.S.C. § 653(b)(4), is simply incorrect. The wage guarantees essentially set a "federal workman's compensation" level of 100 percent of pretransfer wages.

By: /s/ Robert H. Bork

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511
(203) 624-6027

By: /s/ Gregory B. Tobin

GREGORY B. TOBIN
Ogletree, Deakins, Nash,
Smoak, Stewart & Edwards
3920 First National Bank Tower
Atlanta, GA 30303
(404) 588-1300

By: /s/ John S. Battle, Jr.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, VA 23219
(804) 644-4131

MILLIKEN AND COMPANY

By: /s/ Robert T. Thompson

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
(803) 242-3200

ARKWRIGHT MILLS

By: /s/ Thomas A. Evins

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
(803) 582-5630

SPARTAN MILLS

By: /s/ Joseph K. Maddox, Jr.

JOSEPH K. MADDOX, JR.
P. O. Box 5784
Spartanburg, S. C. 29304
(803) 574-0211

BLAIR MILLS, INC.

By: /s/ Robert T. Thompson

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
(803) 242-3200

HERMITAGE, INC.

By: /s/ Robert T. Thompson

ROBERT T. THOMPSON
GARY S. KLEIN
Thompson, Mann & Hutson
The Daniel Building—Suite 2222
Greenville, S. C. 29602
(803) 242-3200

DAN RIVER, INC.

By: /s/ Roger L. Tuttle

ROGER L. TUTTLE
2291 Memorial Drive
Danville, VA 24541
(804) 799-7121

CONE MILLS CORPORATION

By: /s/ Samuel K. Abrams

SAMUEL K. ABRAMS
BRIAN E. MORAN
Baker & Hostetler
818 Connecticut Avenue, N.W.
Washington, D. C. 20006
(202) 293-6260

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
1201 Maple Street
Greensboro, N. C. 27405
(919) 279-6567

MAYFAIR MILLS

By: /s/ Thomas A. Evins

THOMAS A. EVINS
CLYDE H. HAMILTON
Butler, Means, Evins & Browne
P. O. Box 451
Spartanburg, S. C. 29304
(803) 582-5630

SPRINGS MILLS, INC.

By: /s/ Dan M. Byrd, Jr.

DAN M. BYRD, JR.
J. SPRATT WHITE
P. O. Box 70
Fort Mill, S. C. 29715
(803) 547-2901

RIEGEL TEXTILE CORPORATION

By: /s/ Fred M. Richardson

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
Constangy, Brooks & Smith
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, GA 30303
(404) 525-8622

FIELDCREST MILLS, INC.

By: /s/ John S. Battle, Jr.

JOHN S. BATTLE, JR.
ROBERT E. PAYNE
THOMAS W. MCCANDLISH
McGuire, Woods & Battle
1400 Ross Building
Richmond, VA 23219
(804) 644-4131

WEST POINT-PEPPERELL, INC.

By: /s/ Richard H. Monk, Jr.

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P. O. Box 71
West Point, GA 31833
(205) 756-7111

CERTIFICATE OF SERVICE

The undersigned, who certifies that he is a member of the bar of this Court, hereby certifies that on this 14th day of August, 1980, three copies of the foregoing Supplement To Petition For A Writ Of Certiorari And Reply To Brief For The Federal Respondents filed by the American Textile Manufacturers Institute, Inc., Milliken & Company, Arkwright Mills, Spartan Mills, Blair Mills, Inc., Hermitage, Inc., Dan River, Inc., Cone Mills Corporation, Mayfair Mills, Springs Mills, Inc., Riegel Textile Corporation, Fieldcrest Mills, Inc. and West Point-Pepperell, Inc. were mailed, postage prepaid, to each of the following persons at the addresses indicated below:

Charles M. Crump, Esq.
Apperson, Crump, Duzane & Maxwell
2610-100 North Main Building
Memphis, Tennessee 38103

Carl W. Vogt, Esq.
Fulbright & Jaworski
1150 Connecticut Avenue, N.W.
Washington, D.C. 20036

Neal P. Gillen, Esq.
1701 L Street, N.W., Suite 460
Washington, D.C. 20036

J. Albert Woll, Esq.
815 Sixteenth Street, N.W.
Washington, D.C. 20006

George H. Cohen, Esq.
Jeremiah A. Collins, Esq.
Bredhoff, Gottesman, Cohen & Weinberg
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036

Arthur M. Goldberg, Esq.
15 Union Square
New York, New York 10003

John A. Bryson, Esq.
Allen H. Feldman, Esq.
United States Department of Labor
Room S4004
200 Constitution Avenue, N.W.
Washington, D.C. 20210

Wade H. McCree, Jr.
Solicitor General
Department of Justice
Washington, D.C. 20530

By: /s/ Robert E. Payne

PAGE PROOF

Supreme Court, U. S.
FILED
NOV 20 1980
MICHAEL RODAK, JR., CLERK

No. 79-1429
(Consolidated with No. 79-1583)

IN THE
Supreme Court of the United States
OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

BRIEF FOR PETITIONERS

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART AND EDWARDS
First National Bank Tower
Two Peachtree Street, N.W.
Atlanta, Georgia 30383

NEIL J. KING
Counsel of Record
A. STEPHEN HUT, JR.
ANDREW N. VOLLMER
WILMER & PICKERING
1666 K Street, N.W.
Washington, D.C. 20006
(202) 872-6000

Counsel for American Textile Manufacturers Institute, Inc.

[Counsel for other Petitioners are listed on inside cover]

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Milliken and Company

JOSEPH K. MADDOX, JR.
P.O. Box 5784
Spartanburg, S.C. 29304

Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Hermitage, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
BAKER & HOSTETLER
818 Connecticut Ave., N.W.
Washington, D.C. 20006

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
Greensboro, N.C. 27405

Counsel for Cone Mills Corporation

DAN M. BYRD, JR.
J. SPRATT WHITE
P.O. Box 70
Fort Mill, S.C. 29715

Counsel for Springs Mills, Inc.

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

Counsel for Fieldcrest Mills, Inc.

November 20, 1980

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Arkwright Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Blair Mills, Inc.

HARLAN H. HUNTLEY
ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541

Counsel for Dan River, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Mayfair Mills

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
CONSTANGY, BROOKS & SMITH
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P.O. Box 71
West Point, Georgia 31833

Counsel for West Point-Pepperell, Inc.

QUESTIONS PRESENTED FOR REVIEW

1. Whether Congress gave the Occupational Safety and Health Administration ("OSHA") the unprecedented power to set enormously costly occupational health standards in disregard of their economic impact, the sole limit being that the costs of a single standard must not be so great as to threaten the destruction of an entire industry.

2. Whether Congress intended to permit OSHA to adopt standards that consume enormous amounts of society's limited industrial hygiene resources without regard to whether such standards would produce any significant or discernible reduction in a risk of material health impairment.

3. Whether OSHA has the authority to require that employers transfer and guarantee the wages and benefits of workers who are not suffering from any occupationally-related health impairment.*

---

* In addition to the parties listed in the caption of the case, the following were parties to the proceeding in the court below: the National Cotton Council; the Cotton Warehouse Association; the American Cotton Shippers Association; the National Cottonseed Products Association; the American Federation of Labor & Congress of Industrial Organizations; the Industrial Union Department, AFL-CIO; and the Amalgamated Clothing and Textile Workers Union. The American Textile Manufacturers Institute, Inc. is a trade associaiton consisting of approximately 175 companies.

TABLE OF CONTENTS

	Page
QUESTIONS PRESENTED FOR REVIEW	i
TABLE OF AUTHORITIES	v
OPINION BELOW	1
JURISDICTION	2
CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED	2
STATEMENT OF THE CASE	2
A. The Nature of Byssinosis	3
B. The Proceedings Before OSHA	7
1. Health Effects Evidence	8
2. The ATMI Alternative	11
3. Evidence on the Economic Impact of the Standard	12
C. OSHA's Adoption of the Standard	14
D. The Decision of the Court Below	17
SUMMARY OF ARGUMENT	19
ARGUMENT	21
I. THE COTTON DUST STANDARD IS PREDICATED UPON LEGALLY INSUFFICIENT CRITERIA FOR ASSESSING THE ANTICIPATED ECONOMIC IMPACT AND REDUCTION IN RISK THAT THE STANDARD IS EXPECTED TO PRODUCE	21
A. The Decision Below Mistakenly Permits OSHA To Adopt Health Standards That Are Subject to No Meaningful or Effective Cost-Related Limitations	22

PREVIOUS PAGE WAS BLANK

TABLE OF CONTENTS—Continued

Page

1. OSHA Failed To Make a Responsible and Supportable Estimate of the Costs of Its Standard or To Apply Any Meaningful Criteria in Assessing the Standard's Economic Impact 24

2. OSHA's Construction of the Act—Under Which the Costs of a Standard Are Irrelevant Short of the Point at Which They Threaten To Ruin an Entire Industry—Is Inconsistent with the Statutory Language and Legislative History 31

B. The Decision of the Court Below Should Be Reversed Because OSHA Did Not Show That the Standard Was Likely To Achieve a Reduction in Risk That Is Significant When Considered in Light of Its Costs 36

1. OSHA Is Required To Show That a Reasonable Relationship Exists Between the Risk Reduction Benefits and the Costs of Its Standards 36

a. The OSH Act as Construed in Benzene 36

b. Judicial and Administrative Precedent 41

2. The Judgment Below Must Be Reversed Because OSHA Did Not Show That the Standard Would Produce a Reduction in Risk That Is Significant in Light of Its Costs 48

II. THE COURT BELOW ERRONEOUSLY CONCLUDED THAT OSHA HAS AUTHORITY TO REQUIRE EMPLOYERS TO MAINTAIN THE WAGES AND BENEFITS OF EMPLOYEES WHO ARE TRANSFERRED FOR REASONS UNRELATED TO HEALTH IMPAIRMENT 51

CONCLUSION 57

APPENDIX 1a

TABLE OF AUTHORITIES

Cases: Page

A.L.A. Schechter Poultry Corp. v. United States, 295 U.S. 495 (1935) 23

AFL-CIO v. Marshall, 617 F.2d 636 (D.C. Cir. 1979) ..... *passim*

Amalgamated Meat Cutters & Butcher Workmen v. Connally, 337 F. Supp. 737 (D.D.C. 1971) 41

American Iron & Steel Institute v. OSHA, 577 F.2d 825 (3d Cir. 1978), *cert. granted*, 48 U.S.L.W. 3855 (U.S. July 2, 1980), *cert. dismissed*, 49 U.S.L.W. 3145 (U.S. Sept. 10, 1980).. 4, 43

American Petroleum Institute v. OSHA, 581 F.2d 493 (5th Cir. 1978), *aff'd sub nom. Industrial Union Department, AFL-CIO v. American Petroleum Institute*, 48 U.S.L.W. 5022 (U.S. July 2, 1980) 14, 27, 41

American Power & Light Co. v. SEC, 329 U.S. 90 (1946) 22

Appalachian Power Co. v. Train, 545 F.2d 1351 (4th Cir. 1976) 44

Aqua Slide 'N' Dive Corp. v. CPSC, 569 F.2d 831 (5th Cir. 1978) 43

Associated Industries of New York State, Inc. v. Department of Labor, 487 F.2d 342 (2d Cir. 1973) 34, 51

D.D. Bean & Sons v. CPSC, 574 F.2d 643 (1st Cir. 1978) 43

Dry Color Manufacturers Association v. Department of Labor, 486 F.2d 98 (3d Cir. 1973) 4

Florida Peach Growers Association v. Department of Labor, 489 F.2d 120 (5th Cir. 1974) 34

Forester v. CPSC, 559 F.2d 774 (D.C. Cir. 1977).. 43

General Electric Co. v. Southern Construction Co., 383 F.2d 135 (5th Cir. 1967), *cert. denied*, 390 U.S. 955 (1968) 56

H & H Tire Co. v. Department of Transportation, 471 F.2d 350 (7th Cir. 1972) 44

TABLE OF AUTHORITIES—Continued

Page

Industrial Union Department, AFL-CIO v. American Petroleum Institute, 48 U.S.L.W. 5022 (U.S. July 2, 1980) ..... *passim*

Industrial Union Department, AFL-CIO v. Hodgson, 499 F.2d 467 (D.C. Cir. 1974) ..... *passim*

Kent v. Dulles, 357 U.S. 116 (1958) 24

Marshall v. West Point Pepperell, Inc., 588 F.2d 979 (5th Cir. 1979) 42

National Cable Television Association, Inc. v. United States, 415 U.S. 336 (1974) 24

National Congress of Hispanic American Citizens v. Marshall, 626 F.2d 882 (D.C. Cir. 1979) 46, 50

National Crushed Stone Association, Inc. v. EPA, 601 F.2d 111 (4th Cir. 1979), *cert. granted*, 48 U.S.L.W. 3535 (U.S. Feb. 19, 1980) 44

National Wildlife Federation v. Andrus, 440 F. Supp. 1245 (D.D.C. 1977) 27

Panama Refining Co. v. Ryan, 293 U.S. 388 (1935) 22

RMI Co. v. Secretary of Labor, 594 F.2d 566 (6th Cir. 1979) 42

Society of the Plastics Industry, Inc. v. OSHA, 509 F.2d 1301 (2d Cir.), *cert. denied*, 421 U.S. 922 (1975) 4

Synthetic Organic Chemical Manufacturers Association v. Brennan, 506 F.2d 385 (3d Cir. 1974), *cert. denied*, 423 U.S. 830 (1975) 4

Synthetic Organic Chemical Manufacturers Association v. Brennan, 503 F.2d 1155 (3d Cir. 1974), *cert. denied*, 420 U.S. 973 (1975) 51

Taylor Diving & Salvage Co. v. Department of Labor, 599 F.2d 622 (5th Cir. 1979) 55

Texas Independent Ginners Association v. Marshall, Nos. 78-2663, *et al.* (5th Cir. Nov. 14, 1980) ..... *passim*

Turner Co. v. Secretary of Labor, 561 F.2d 82 (7th Cir. 1977) 42

United Parcel Service of Ohio, Inc. v. OSHRC, 570 F.2d 806 (8th Cir. 1978) 50

TABLE OF AUTHORITIES—Continued

	Page
United States v. Rock Royal Co-Op, Inc., 307 U.S. 533 (1939)	22
United Steelworkers of America, AFL-CIO-CLC v. Marshall, [1980] OSH Dec. (CCH) 30329, 8 OSH Cas. (BNA) 1810 (D.C. Cir. Aug. 15, 1980)	*passim*
Whirlpool Corp. v. Marshall, 445 U.S. 1 (1980)	55
Yakus v. United States, 321 U.S. 414 (1944)	41
Administrative Decisions and Reports:	
Castle & Cooke Foods, [1977-1978] OSH Dec. (CCH) 26325, 5 OSH Cas. (BNA) 1435 (1977), *appeal docketed*, No. 77-2565 (9th Cir. July 14, 1977)	45
Continental Can Co., [1976-1977] OSH Dec. (CCH) 25250, 4 OSH Cas. (BNA) 1541 (1976)	44-45
Department of Labor Report to the Congress, *Cotton Dust: Review of Alternative Technical Standards and Control Technologies* (May 14, 1979)	47, 49
Great Falls Tribune Co., [1977-1978] OSH Dec. (CCH) 26303, 5 OSH Cas. (BNA) 1433 (1977), *appeal docketed*, No. 77-2566 (9th Cir. July 14, 1977)	45
KLI, Inc., [1977-1978] OSH Dec. (CCH) 26935, 6 OSH Cas. (BNA) 1097 (1977)	45
Making Prevention Pay, Final Report of the Interagency Task Force on Workplace Safety and Health (Dec. 14, 1978)	40
Samson Paper Bag Co., [1980] OSH Dec. (CCH) 30038 (1980)	45
West Point Pepperell, Inc., [1977-1978] OSH Dec. (CCH) 26136, 5 OSH Cas. (BNA) 1257 (1977), *aff'd, Marshall v. West Point Pepperell, Inc.*, 588 F.2d 979 (5th Cir. 1979)	45

TABLE OF AUTHORITIES—Continued

Constitutional and Statutory Provisions: Page

U.S. Const. art. I, § 1 23
15 U.S.C. § 1392(f)(3) (1976) 44
15 U.S.C. § 2058(c)(2)(A) (1976) 43
16 U.S.C. § 1536(a)(2) (Supp. III 1979) 31
21 U.S.C. § 346 (1976) 46
21 U.S.C. § 348(c)(3)(A) (1976) 31
28 U.S.C. § 1254(1) (1976) 2
29 U.S.C. §§ 651-78 (1976 & Supp. III 1979) 2
29 U.S.C. § 651(b) (1976) 31, 32
29 U.S.C. § 652(8) (1976) ..... *passim*
29 U.S.C. § 655(a) (1976) 7
29 U.S.C. § 655(b)(5) (1976) ..... *passim*
29 U.S.C. § 655(f) (1976) 27, 34, 40
29 U.S.C. § 660(a) (1976) 2
29 U.S.C. § 661 (1976) 44
30 U.S.C. §§ 801-960 (1976) 56
30 U.S.C. § 811(a)(7) (Supp. III 1979) 56
30 U.S.C. § 811(d) (1976) 56
30 U.S.C. § 843(b)(2), (3) (1976) 56
33 U.S.C. § 1311(b)(2)(A) (1976 & Supp. III 1979) 44
41 U.S.C. § 35-45 (1976 & Supp. III 1979) 7
42 U.S.C. § 7410(a)(6) (Supp. III 1979) 56
42 U.S.C. § 7412 (Supp. III 1979) 45, 46

Administrative Regulations:

29 C.F.R. § 1910.1025 (1979), *as amended at* 44 Fed. Reg. 50338 (1979), 44 Fed. Reg. 60981 (1979), 44 Fed. Reg. 68828 (1979) 53
29 C.F.R. § 1910.1043 (1979), *as amended at* 45 Fed. Reg. 12416 (Feb. 26, 1980) 14, 24, 52, 54
41 Fed. Reg. 21402 (1976) 45
41 Fed. Reg. 56498 (1976) 4, 5, 7
43 Fed. Reg. 5918 (1978), *set aside, American Petroleum Institute v. OSHA*, 581 F.2d 493 (5th Cir. 1978), *aff'd sub nom. Industrial Union Department, AFL-CIO v. American Petroleum Institute*, 48 U.S.L.W. 5022 (U.S. July 2, 1980) .. 14, 15

TABLE OF AUTHORITIES—Continued

Page

43 Fed. Reg. 8808 (1978) 46
43 Fed. Reg. 21838 (1978) 46
43 Fed. Reg. 27350 (1978), *amended*, 43 Fed. Reg. 28473 (1978), 43 Fed. Reg. 35032 (1978), 43 Fed. Reg. 56893 (1978) ..... *passim*
43 Fed. Reg. 52952 (1978) 28, 53
43 Fed. Reg. 54354 (1978) 28
44 Fed. Reg. 58642 (1979) 32, 45, 46
45 Fed. Reg. 53672 (Aug. 12, 1980) 39

Legislative Materials:

115 Cong. Rec. 22517 (1969) 33
Senate Subcommittee on Labor of the Committee on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971) 6, 33, 34, 35
H.R. 16785, 91st Cong., 2d Sess. (1970), *reprinted in* Senate Subcommittee on Labor of the Committee on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971) 55
S. Rep. No. 91-1282, 91st Cong., 2d Sess. (1970), *reprinted in* Senate Subcommittee on Labor of the Committee on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971) 6

Miscellaneous:

Currie, *OSHA*, 1976 Am. B. Foundation Research J. 1107 (1976) 32
J. Freedman, *Crisis and Legitimacy* (1978) 23
Kasper, *Cost-Benefit Analysis in Environmental Decisionmaking*, 45 Geo. Wash. L. Rev. 1013 (1977) 47

TABLE OF AUTHORITIES—Continued

	Page
Monthly Labor Review (March 1975)	25
Monthly Labor Review (Oct. 1978)	25
National Academy of Sciences, *Decision Making for Regulating Chemicals in the Environment* (1975)	47
Oi, *On the Economics of Industrial Safety*, 38 L. & Contemp. Prob. 669 (1974)	47
Stewart, *The Reformation of American Administrative Law*, 88 Harv. L. Rev. 1667 (1975)	24
The Supreme Court, 1979 Term, 94 Harv. L. Rev. 75, 242 (1980)	*passim*
Tumorigenic Citations Subfile of the Registry of Toxic Effects of Chemical Substances (Oct. 1979) (National Inst. for Occupational Safety and Health)	39

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429
(Consolidated with No. 79-1583)

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF FOR PETITIONERS

OPINION BELOW

The opinion of the United States Court of Appeals for the District of Columbia Circuit is reported at 617 F.2d 636 and is reprinted in the Appendix to the Petition for Certiorari ("Pet. App.") at 19. The challenged regulation and the statement of reasons accompanying it appear

at 43 Fed. Reg. 27350 (1978), as amended at 43 Fed. Reg. 28473 (1978), 43 Fed. Reg. 35032 (1978), and 43 Fed. Reg. 56892 (1978).

JURISDICTION

The court of appeals entered judgment on October 24, 1979. Petitioners filed a timely petition for rehearing on November 7, 1979, which the court below denied on January 11, 1980. Pet. App. at 103. Petitioners filed a timely petition for a writ of certiorari on March 14, 1980, invoking jurisdiction under 28 U.S.C. § 1254(1) and 29 U.S.C. § 660(a). This Court granted the petition by order dated October 6, 1980.

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

Relevant sections of the United States Constitution and the Occupational Safety and Health Act of 1970, 29 U.S.C. §§ 651-78 (1976 & Supp. III 1979) (the "OSH Act" or "Act") are set forth in the Appendix to this Brief.

STATEMENT OF THE CASE

Petitioners, the American Textile Manufacturers Institute, Inc. ("ATMI") and twelve individual textile manufacturing companies, brought this action for judicial review of the Standard for Occupational Exposure to Cotton Dust (the "Cotton Dust Standard" or "Standard"), promulgated by the Occupational Safety and Health Administration ("OSHA") on June 19, 1978. 43 Fed. Reg. 27350 (1978), *as amended at id.* 28473, *id.* 35032, *id.* 56893. The Standard was promulgated pursuant to the OSH Act, Section 3(8) of which authorizes OSHA to adopt standards requiring "conditions, . . . practices, . . . operations or processes, reasonably necessary or ap-

propriate to provide safe or healthful employment and places of employment." 29 U.S.C. § 652(8). Section 6(b)(5) of the Act provides that

> in promulgating standards dealing with toxic materials or harmful physical agents . . . , [OSHA] shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity . . . .

Id. § 655(b)(5).

OSHA adopted the Standard purportedly to protect workers in the textile manufacturing and other cotton handling industries from the risk of contracting byssinosis, a respiratory condition that has been associated with exposure to cotton dust. Petitioners agree that, subject to the requirements and limitations of the Act, textile workers should be protected against serious and disabling effects of byssinosis. The dispute in this case centers on whether OSHA's adoption of the Cotton Dust Standard conformed with the applicable statutory requirements and limitations—particularly as they relate to risk reduction and cost considerations. Petitioners believe that the Standard must be set aside because OSHA misapprehended the nature of the economic impact inquiry that the Act requires and imposed a wage guarantee obligation that has no statutory basis.

A. The Nature of Byssinosis

Cotton dust is not a carcinogen, and byssinosis, the health impairment to which the Cotton Dust Standard is addressed, is not a form of cancer. Unlike cancer, byssinosis can be detected in its early stages when it is

reversible and nondisabling.[1] In these respects, the Cotton Dust Standard differs from the Benzene Standard reviewed by this Court and from all of the other toxic substance standards that had been reviewed by the courts of appeals prior to the decision of the court below.[2]

The respiratory effects that characterize byssinosis have been categorized into four "grades" (½, 1, 2, and 3). 41 Fed. Reg. 56498, 56500-01 (1976). Grade ½ byssinosis is generally characterized by occasional chest tightness on Mondays; it is mild and reversible and disappears entirely upon removal from exposure.[3] Indeed, Grade ½ byssinosis cannot really be deemed a health impairment of any sort, since it involves essentially

---

[1] The fact that byssinosis is not a malignant disease is also reflected by the fact that textile workers have not been found to exhibit an excess incidence of mortality as a result of their exposure to cotton dust. *See* Ex. 6, No. 76 at III-6. Citations to the record compiled by OSHA include references to exhibits ("Ex.") and transcript testimony ("Tr.").

[2] *See Industrial Union Dep't, AFL-CIO v. American Petroleum Inst.*, 48 U.S.L.W. 5022 (U.S. July 2, 1980) (Benzene Standard); *American Iron & Steel Inst. v. OSHA*, 577 F.2d 825 (3d Cir. 1978), *cert. granted*, 48 U.S.L.W. 3855 (U.S. July 2, 1980), *cert. dismissed*, 49 U.S.L.W. 3145 (U.S. Sept. 10, 1980) (Coke Oven Emissions Standard); *Society of the Plastics Indus., Inc. v. OSHA*, 509 F.2d 1301 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975) (Vinyl Chloride Standard); *Synthetic Organic Chem. Mfrs. Ass'n v. Brennan*, 506 F.2d 385 (3d Cir. 1974), *cert. denied*, 423 U.S. 830 (1975) (standard for 14 carcinogenic chemicals); *Industrial Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467 (D.C. Cir. 1974) (Asbestos Dust Standard); *Dry Color Mfrs. Ass'n v. Department of Labor*, 486 F.2d 98 (3d Cir. 1973) (standard for 14 carcinogenic chemicals).

[3] *See* 43 Fed. Reg. at 27354, col. 2; 41 Fed. Reg. at 56500, col. 3. Recent studies indicate that from 50-75% of those individuals reporting any symptoms of byssinosis at all are classified in Grade 1/2. Pet. App. at 117, 125, 129.

"nebulous, transient feelings";[4] a person exhibiting Grade ½ symptoms is not sick, impaired or disabled.[5]

Grade 1 byssinosis is characterized by chest tightness and/or breathlessness occurring only on Mondays after an absence from work of approximately two days. Grade 2 symptoms involve chest tightness and/or breathlessness on Mondays and other days. Like Grade ½, Grades 1 and 2 are generally considered to be reversible.[6]

Grade 3 byssinosis is characterized "by grade two symptoms accompanied by evidence of permanent incapacity from diminished effort tolerance and/or reduced ventilatory capacity." *Id.* Although respected medical opinion suggests that even Grade 3 byssinosis may be reversible,[7] other studies conclude that, in most cases, Grade 3 is not reversible. It is Grade 3 byssinosis—the advanced, chronic variety—that OSHA has described as being irreversible and disabling, constituting a form of chronic obstructive pulmonary disease. 43 Fed. Reg. at 27352.

In sum, the term "byssinosis" standing by itself is a very imprecise description of health conditions that vary from a mild, reversible, nondisabling symptom to what in some instances may become a chronic, often irreversible, and disabling disease. Although it is not known what component of cotton dust causes byssinosis, there is general agreement that some workers exposed to high enough concentrations of cotton dust will develop some symptoms

---

[4] Ex. 41 (Dr. Russell Harley); *see also* Tr. 1447 (Dr. W.K.C. Morgan); Tr. 1515 (Dr. Russell Harley); Tr. 813-14 (Dr. El Batawi).

[5] Tr. 1779 (Dr. Charles F. Martin); Pet. App. at 157, 161 (Dr. Jack W. Whitworth).

[6] 41 Fed. Reg. at 56500; *Texas Independent Ginners Ass'n v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1212 (5th Cir. Nov. 14, 1980) (copies of this recent opinion have been lodged with the Court).

[7] Ex. 41 at 8 (Dr. Russell Harley).

of Grade ½ byssinosis and that, if exposure continues for long enough, the condition could progress, over time, to the more severe chronic and disabling stage. However, the overwhelming majority of persons exposed to cotton dust do not exhibit any symptoms of byssinosis at all even after long exposure,[8] and a worker who has developed the early mild symptoms of byssinosis will revert to a normal state if removed from exposure.[9]

At the time that Congress was considering the OSH Act in 1970, concern was expressed about the occurrence of the disabling form of byssinosis among workers in certain operations within the textile industry.[10] However, Congress did not indicate concern about the mild, reversible and nondisabling symptoms that characterize the lower grades of byssinosis. Moreover, the data before Congress in 1970 reflected experience with byssinosis during the early and mid-1960s when there were virtually no medical surveillance or other protective programs in effect. As discussed below, medical surveillance (accompanied by respirator use and selective employee transfer) is an effective means of reducing the incidence of the chronic and disabling form of byssinosis. Since no such programs were operative in the 1960s (when cotton dust exposures were almost certainly higher than at present),[11] experience from that period has very little

---

[8] *See, e.g.*, Pet. App. at 123a, 125; *see also Texas Independent Ginners Ass'n v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1212.

[9] *See, e.g.*, 43 Fed. Reg. at 27354, col. 3.

[10] S. Rep. No. 91-1282, 91st Cong., 2d Sess. 3 (1970), *reprinted in* Senate Subcomm. on Labor of the Comm. on Labor and Pub. Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970, at 143 (Comm. Print 1971) [hereinafter "Leg. Hist."].

[11] Until the latter part of the 1960s, neither the government nor any private standard-setting organization had placed a limit upon exposure to cotton dust. 43 Fed. Reg. at 27351, col. 1. As OSHA's witness, Dr. Arend Bouhuys, observed, byssinosis has

relevance to whether OSHA's Standard is necessary to prevent or reduce a significant health risk today.

B. The Proceedings Before OSHA

Within the textile manufacturing industry, cotton is handled in a series of successive operations, beginning with "opening" through "roving," [12] continuing with "spinning" through "warping," [13] and concluding in "slashing" and "weaving." [14]

Before 1971, no mandatory exposure limit was generally applicable to these operations, although a permissible exposure limit ("PEL") of 1.0 milligram of total cotton dust (raw) per cubic meter of air (1.0 mg/m^3) was established for federal contractors under the Walsh-Healey Act. 41 U.S.C. §§ 35-45 (1976 & Supp. III 1979). In 1971, OSHA adopted this limit as an established Federal standard under Section 6(a) of the Act, 29 U.S.C. § 655(a); consequently, the PEL of 1 mg/m^3 applied to all operations in the textile manufacturing industry. *See* 43 Fed. Reg. at 27351, col. 1. That standard, however, did not require medical surveillance.

In December 1976, OSHA published a proposal to revise the standard by reducing the PEL, in all segments of the cotton industry, to 0.2 mg/m^3 of cotton dust as measured by a vertical elutriator.[15] Testimony and

---

been perceived as an important health hazard for United States cotton textile workers only since 1967. *See* Ex. 11 at 6.

[12] In the operations of "opening," "picking," "carding," "drawing," and "roving," raw cotton is cleaned and prepared for spinning into yarn.

[13] In the operations of "spinning," "twisting," "winding," "spooling," and "warping," the prepared cotton is transformed into yarn and packaged for weaving or other processing.

[14] In "slashing" and "weaving," the yarn is manufactured into a woven fabric.

[15] 41 Fed. Reg. 56498 (1976). For the operations of "opening," "picking," and "carding," there is some evidence that a limit of

written comments in the proceeding focused on the health need for the severe standard that OSHA had proposed, as well as on the standard's technological feasibility and the economic impact that it would have on the affected industries and the economy as a whole. What follows is a brief description of the principal evidence on health effects and economic impact.[16]

1. *Health Effects Evidence*

For its health effects determination, OSHA placed principal reliance upon the so-called "Merchant Study" concluded in April 1971.[17] Among textile workers not subject to a medical surveillance or respiratory protection program, Merchant claimed to have found that the predicted prevalence rate of byssinosis (for Grades ½, 1 and 2 on an undifferentiated basis) was approximately 7 percent at exposures of 0.1 mg/m³, 13 percent at exposures of 0.2 mg/m³ and 26 percent at exposures of 0.5 mg/m³ in the operations of opening through warping.[18] Although these findings were subject to serious ques-

---

0.2 mg/m³ of *vertical elutriated* cotton dust may be approximately equivalent to a limit of 0.4 mg/m³ of *total* cotton dust. Tr. 2396-97 (Hovan Hocutt). No such correlation between "vertical elutriated" and "total" dust has been established for any other operations. *Id.*; Tr. 2022-25 (Dr. John Neefus).

[16] The question of the Standard's technological feasibility *per se* is not before the Court at this time, and need not be considered except to the extent that it relates to the economic impact of the Standard.

[17] *See* 43 Fed. Reg. at 27355; Exs. 38d, 6, Nos. 44 & 51,

[18] 43 Fed. Reg. at 27355; Ex. 6, No. 51, Table 4, Charts for Groups. The "prevalence rate" is intended to relate the *current* exposure levels to the percentage of employees with specified symptoms. It does not purport to show that the current exposures caused those symptoms. *See* Ex. 38d at 103; Ex. 26 at 2.

tion,[19] the significance of the findings, even when accepted at face value, is easily overstated.

First, the Merchant Study does not establish a dose-response relationship showing the percentage probability that workers exposed to specified levels of cotton dust will develop byssinosis.[20] Rather, as Merchant admitted, his study purported to show only the *prevalence* rate of byssinosis (Grades ½, 1 and 2) *at a particular time* among workers who already had reacted to unknown (and presumably higher) exposure levels in the past.[21] Second, more than 50 percent of those who indicated any symptoms of byssinosis at all in the Merchant Study were recorded as Grade ½.[22] Finally, since none of the workers in Merchant's study had participated in a medical surveillance program, Merchant's findings reveal nothing about how the prevalence of byssinosis (particularly the higher grades) would vary from one exposure level to another, if the various exposure limits were combined with a program of medical surveillance, respirator use, and employee transfer in appropriate cases. Thus, even taken at face value, the Merchant Study

---

[19] The Merchant Study was shown to contain errors in data selection, methodology, and analysis that led to the prediction of "the highest possible value of predicted prevalence at any hypothesized dust level." *E.g.*, Ex. 55 at 2-9 (Dr. Moon W. Suh). Dr. Merchant himself testified:

> Clearly no inference from our study can be drawn as to the prevalence of byssinosis in the entire U.S. textile industry . . . .

Tr. 1032. Even OSHA admitted that there were "some weaknesses in the Merchant data . . . and, consequently, . . . weakness of some correlation coefficients." 43 Fed. Reg. at 27357, col. 3.

[20] *See* Ex. 38d at 103.

[21] Ex. 26 at 2.

[22] Ex. 6, No. 51, Table 4, Groups 3 & 6; Tr. 1162-63 (Dr. Merchant).

must be interpreted very cautiously; it cannot blithely be applied to circumstances that differ substantially from those studied by Merchant.

The Merchant Study cannot be taken at face value, however. Not only did it contain methodological flaws,[23] but also it was inconsistent with a number of more recent studies of larger worker populations, which indicated that the actual prevalence of byssinosis in the textile manufacturing industry was far below the levels suggested by Merchant.

For example, a 1976 study conducted by Dr. Hans Weill, an OSHA witness at the hearing, found that among workers who had participated in a medical surveillance program, the prevalence of byssinosis was markedly low at exposure levels above 0.2 mg/m^3 and that even at levels of 0.5 mg/m^3 and above, it was substantially lower than the rate reported by Merchant.[24] Dr. Weill's findings were consistent with those of Dr. W.K.C. Morgan, who found that only 0.4% of the workers whom he studied in 1976 (workers who also had been subject to medical surveillance) reported any symptoms of byssinosis—despite the fact that they were exposed to cotton dust levels ranging up to more than 1.0 mg/m^3.[25] Studies reported by individual textile companies were in accord with the Weill and Morgan findings.[26]

---

[23] *See* note 19 *supra*.

[24] Ex. 13A at 14-15, 44-45; Tr. 294-95.

[25] Exs. 39, 39a, 40, 43, 47b.

[26] Thus, studies of more than 10,000 textile workers by Burlington Industries revealed a prevalence rate (Grades 1/2, 1 and 2) of 4.5% in 1971 and 1.0% in 1976. Pet. App. at 108, 172-75 (Drs. Harold R. Imbus & Moon W. Suh). A 1973 study of more than 9,000 West Point-Pepperell textile workers exposed to dust levels ranging from less than 0.2 mg/m^3 to more than 1.0 mg/m^3 showed that only 1.34% of the workers reported byssinosis symptoms of any grade, and that 70.7% of these were Grade 1/2, with only two

These studies are significant in several respects. For one thing, taken as a group, they provide persuasive evidence that the byssinosis prevalence findings reported in the Merchant Study overstate the predicted level of byssinosis among textile workers.[27] This point takes on added significance in light of the fact that these other studies are more recent, more extensive, and thus more indicative of the current state of affairs in the industry. More importantly, these studies demonstrated that a medical surveillance program (combined with the selective use of respirators and transfer of employees in appropriate cases) is an effective means to achieve a very significant reduction in the occurrence of byssinosis (particularly the more serious grades) among textile workers. Indeed, OSHA itself recognized this point. *See* 43 Fed. Reg. at 27359, col. 3.

2. *The ATMI Alternative*

Based upon this experience, ATMI and individual textile companies urged OSHA to consider and adopt an alternative to the OSHA proposal. The alternative proposed less stringent exposure limits than OSHA's standard, combined with an active and effective medical surveillance program that would identify employees having the mild reversible symptoms of byssinosis.[28] Such employees could then be protected against any risk of dis-

---

workers (in the entire study population of more than 9,000) exhibiting Grade 2 symptoms. Pet. App. at 124-125, 157-161 (Dr. Jack W. Whitworth). Similarly, a 1973 study of more than 6,600 Cone Mills textile workers found that approximately 3% of the workers reported symptoms of Grades 1/2 and 1 (more than 70% of these being Grade 1/2), with no workers reporting symptoms of Grade 2 byssinosis. Pet. App. at 126-129 (Dr. Charles F. Martin).

[27] *See* Comments of the Council on Wage and Price Stability, Ex. 111 at 16-18.

[28] *See* Ex. 160 at 86-89.

abling or irreversible lung damage by selective use of respirators or transfer to low exposure areas, as medically appropriate for the individual concerned. On the basis of the experience that had accumulated since 1970, ATMI argued that this alternative would provide effective and cost-efficient protection for textile workers against any significant risk of material lung damage from exposure to cotton dust.

3. *Evidence on the Economic Impact of the Standard*

Two principal analyses addressed the issue of economic impact. One, the Hocutt-Thomas study, was presented by the principal suppliers of dust control equipment to the textile industry. It concluded that textile manufacturers would incur capital costs of $550 million to achieve *much less stringent exposure limits* than those established in OSHA's Standard. 43 Fed. Reg. at 27372, 27380.[29] The second economic analysis, prepared by OSHA's outside contractor, Research Triangle Institute ("RTI"), estimated that the textile industry would incur capital costs of $1.1 billion in 1974 dollars to achieve the Standard's exposure limit of 0.2 mg/m^3 in the operations of opening through warping alone.[30]

RTI expressed considerable concern about the ability of many textile firms to finance the capital expenditures that it estimated would be required to reach the PEL set by the standard. According to RTI,

---

[29] The PELs for which the Hocutt-Thomas cost estimate was developed were 0.2 mg/m^3 in opening through roving, 0.5 mg/m^3 in spinning through warping, and 1.0 mg/m^3 in slashing and weaving. Pet. App. at 152-56.

[30] This consisted of $984.4 million in opening through spinning, *see* Pet. App. at 139; 43 Fed. Reg. at 27371, and $127.7 million in winding through warping, *see* Ex. 6, No. 76 at V-28. RTI estimated the total capital cost of the proposed standard for all industry segments to be $2.7 billion. Pet. App. at 139.

> unless the compliance capital investments are spread over a substantial number of years [RTI envisioned an eight-year period] all the companies engaged heavily in cotton yarn production will face severe difficulty in financing compliance capital for the 0.2 mg/m^3 exposure limits and the difficulty will be more intense for smaller companies.[31]

In RTI's view, implementation of the Standard would be difficult for many firms and would result in adjustments in the structure of the textile manufacturing industry.[32] Although RTI did not believe that the severe impact of the Standard would threaten the existence of the cotton textile industry as a whole, it reached this conclusion only by adopting (without any supporting analysis) what it characterized as the "extreme assumption" that the costs of the Standard could be passed on fully in product prices. Pet. App. at 144; 43 Fed. Reg. at 27370. RTI noted that if the opposite assumption of no price increases were made, all industry sectors would have "negative 'profits after taxes' " under a 0.2 mg/m^3 standard. Pet. App. at 143. Other witnesses echoed this concern about the ability of the industry to finance the required capital expenditures.[33]

---

[31] Ex. 6, No. 76 at VI-48. These difficulties would be occasioned because, as RTI noted, profits in the textile industry have been low since the mid-1950s, averaging about one-half of the profit percentage for United States manufacturers as a whole. *Id.* at C-27. This poor profit performance, RTI observed, had led to a decline of nearly 37% in textile industry investment in plant and equipment between 1947 and 1974, a period in which plant and equipment expenditures by U.S. manufacturers as a whole had steadily increased. *Id.* at C-21, Table C-12.

[32] Tr. 561-63 (Dr. LeSourd).

[33] Thus, John P. Figh of the Chase Manhattan Bank testified that the standard would threaten the viability of a number of firms in the textile industry, particularly the smaller firms. Pet. App. at 191-95.

C. OSHA's Adoption of the Standard

On June 19, 1978, OSHA adopted the final Standard. The Standard establishes a PEL of 0.2 mg/m^3 of cotton dust as measured by a vertical elutriator in the textile manufacturing operations of opening through warping (yarn manufacturing) and a PEL of 0.75 mg/m^3 in slashing and weaving.[34] In all cases, the applicable PEL is to be achieved solely through the use of engineering and work practice controls, and such controls are to be implemented fully within four years.[35] The Standard also imposes a host of ancillary requirements, including exposure monitoring, medical surveillance, work practice restrictions and provisions requiring employers to transfer and to guarantee the earnings, rights and benefits of employees who are unable to wear respirators in circumstances where the Standard requires their use.[36]

OSHA took the same approach to setting exposure limits for cotton dust as it has in setting standards for carcinogens, including benzene.[37] Finding that for cotton dust, as for carcinogens, there is no absolutely safe level of exposure, OSHA concluded that the Act requires it to set the exposure limit at a level that will "assure maximum benefit . . . constrained only by the limits of feasibility." 43 Fed. Reg. at 27378, col. 3. As inter-

---

[34] 29 C.F.R. § 1910.1043(c) (1979), Pet. App. at 3. In other covered segments of the cotton handling and processing industry, the PEL is 0.5 mg/m^3. *Id.*

[35] 29 C.F.R. § 1910.1043(e), (g), (m) (1979), *as amended at* 45 Fed. Reg. 12416 (1980), Pet. App. at 5-6, 9-10, 17-18.

[36] *See, e.g.*, 29 C.F.R. § 1910.1043(d), (f), (g), (h) (1979), Pet. App. at 3-13.

[37] 43 Fed. Reg. 5918 (1978), *set aside, American Petroleum Inst. v. OSHA*, 581 F.2d 493 (5th Cir. 1978), *aff'd sub nom. Industrial Union Dep't, AFL-CIO v. American Petroleum Inst.*, 48 U.S.L.W. 5022 (U.S. July 2, 1980).

preted by OSHA, this means that the exposure limit must be set at the lowest level that is technologically achievable, as long as the costs of implementing such technology will not threaten the existence of the affected industry as a whole. 43 Fed. Reg. at 27378.

Moreover, as in the case of benzene, OSHA specifically rejected the contention that it must assess the benefits of the Cotton Dust Standard in light of its costs or consider the relative health effectiveness and costs of alternative approaches.[38] For cotton dust, as for benzene, once OSHA had determined that the Standard was "within the financial capability of the covered industries," it considered its economic analysis to be complete.[39] Echoing word for word the approach that it took in the Benzene proceeding, the agency declared "that the benefits of the proposed standard are likely to be appreciable," and asserted that, having made such a determination,

> OSHA is not obligated to carry out further exercises toward more precise calculations of benefit which would not significantly clarify the ultimate decision.[40]

OSHA acknowledged that the early, mild stages of byssinosis are reversible, 43 Fed. Reg. at 27352, 27354, that these early, nondisabling effects progress to the chronic state only with further exposure, *id.* at 27354, and that "a properly managed [medical surveillance] program should identify affected workers well before the onset of chronic obstructive pulmonary disease," *id.* at 27359, col. 3. Nonetheless, OSHA summarily rejected

---

[38] 43 Fed. Reg. at 27379, col. 3 (Cotton Dust); 43 Fed. Reg. at 5941, col. 2 (Benzene).

[39] 43 Fed. Reg. at 27379, col. 3 (Cotton Dust); 43 Fed. Reg. at 5941, col. 2 (Benzene).

[40] 43 Fed. Reg. at 27379, col. 3 (Cotton Dust); 43 Fed. Reg. at 5941, col. 2 (Benzene).

ATMI's proposed alternative, apparently because of its belief (1) that even the mild, nondisabling and reversible symptoms of byssinosis constitute "material impairment of health" within the meaning of the OSH Act, and (2) that the most stringent approach (providing the maximum degree of protection possible against even mild, reversible symptoms) must always be adopted in any single health standard, so long as compliance *with that one standard* will not threaten the financial viability of the entire industry, 43 Fed. Reg. at 27378, col. 2.[41]

OSHA's treatment of the Standard's cost impact was enigmatic. As noted above, the only estimate of the capital cost of a 0.2 mg/m^3 standard in yarn manufacturing operations was the $1.1 billion figure presented by OSHA's contractor, RTI. However, OSHA rejected the RTI cost estimate out of hand. Instead, OSHA decided that an appropriate estimate of the capital cost of the Standard for the textile industry would be the $550 million estimate developed by Hocutt and Thomas for a less stringent standard with higher exposure limits. OSHA was unable to demonstrate (and, indeed, made no real effort to demonstrate) how the Hocutt-Thomas figures could be transmuted into an accurate estimate of the costs of an entirely different standard having much more stringent exposure limits.

Relying on RTI's "extreme assumption" that the compliance costs of the Standard would be passed on in product prices, OSHA then concluded that the Standard would be economically feasible, since capital costs of $550 million would not threaten the economic viability of the

---

[41] In light of the approach followed by OSHA, it is not surprising that the preamble to the Cotton Dust Standard, like the preamble to the Benzene Standard, makes no reference whatsoever to Section 3(8) of the OSH Act and no finding that the Standard is "reasonably necessary or appropriate to provide safe or healthful employment and places of employment."

industry as a whole. 43 Fed. Reg. at 27377-78; Pet. App. at 144. OSHA reached this conclusion despite its recognition that some employers would be forced to shut down and that the financial impact of the Standard would be felt more acutely by smaller firms, thus enhancing a trend toward concentration within the industry. 43 Fed. Reg. at 27378, col. 2.

D. The Decision of the Court Below

In all significant respects, the court below upheld the approach to setting occupational health standards that OSHA had followed in the Cotton Dust proceeding. The court agreed that, under the Act, OSHA must adopt the standard that provides the maximum degree of protection against any risk of health impairment, as long as that standard is technologically feasible and not financially ruinous to the industry as a whole. Pet. App. at 53-54, 617 F.2d at 655. According to the court, nothing in the OSH Act requires any further assessment of the health protection benefits of the Standard in light of its costs, Pet. App. at 71, 617 F.2d at 663, or of the relative risk reduction that might be achieved by less costly alternatives.

The court acknowledged that the early symptoms of byssinosis are reversible, Pet. App. at 53, 617 F.2d at 655, and did not find that these symptoms constitute "material impairment" of health within the meaning of the Act. Pet. App. at 50-51 n.83, 617 F.2d at 654 n.83. Nonetheless, believing that OSHA's more stringent (and far more costly) approach would provide some additional protection beyond ATMI's proposed alternative, the court declined to require OSHA to attempt to assess the extent of this additional protection or to consider the benefit of such additional protection in light of the costs. *Id.*

The only economic question that the court below deemed relevant was whether the Standard would have such a devastating cost impact as to make financial viability impossible for the industry as a whole, effectively "put-[ting] the industry out of business." Pet. App. at 69, 617 F.2d at 662.[42] The fact that a number of plants and small companies might be forced to close, thereby changing the market structure of the industry, did not "signify economic infeasibility" in the court's view, Pet. App. 67-68 & n.148, 617 F.2d at 661-62 & n.148, particularly since OSHA had found an existing trend toward increasing concentration in the industry.[43] Moreover, in finding the Standard to be economically feasible, the court, like OSHA, relied on RTI's "extreme assumption" that the costs of compliance would be passed on in product prices and did not require OSHA to present any evidence to support that assumption. Pet. App. at 67 n.145, 617 F.2d at 661 n.145.

Finally, the court did not require OSHA to base its economic impact analysis upon any study that purported to assess the costs of the Standard actually adopted. Rather, the court sustained OSHA's decision to use the Hocutt-Thomas cost estimate, even though that estimate addressed the costs of a much less stringent standard. The court thus permitted the agency to choose between two cost estimates, both of which it had found to be inaccurate, and to adopt a Standard the costs of which were not assessed in any study that OSHA believed to be valid.

---

[42] At the same time, the court conceded that "the actual test for economic feasibility has yet to be fully developed by the courts." Pet. App. at 67, 617 F.2d at 661.

[43] Curiously, the court held that OSHA had not established the economic feasibility of its Standard as applied to the cottonseed oil industry, despite the fact that there too OSHA had pointed to similar factors independent of the Standard that would contribute to anticipated shutdowns in the industry. Pet. App. at 90-91, 617 F.2d at 671-72.

SUMMARY OF ARGUMENT

I.

This case calls upon the Court to decide what determinations OSHA must make regarding the economic impact of its health standards. OSHA's approach treats the costs of its standards as being totally irrelevant until they reach some undefined point at which the standard, if implemented, would cause the destruction of an entire industry. This interpretation of the Act leaves OSHA with virtually unfettered authority to impose enormous costs upon American employers. Only a few months ago, this Court rejected OSHA's claim to such extravagant authority. *Industrial Union Department, AFL-CIO v. American Petroleum Institute*, 48 U.S.L.W. 5022 (U.S. July 2, 1980) [hereinafter "*Benzene*"].

In that case, OSHA claimed that it need take no account of the magnitude of the health risks being addressed. In this case, OSHA asserts that it need take no account of costs short of the point where they threaten the ruination of an entire industry. If OSHA's position were accepted, the agency would enjoy precisely the "unprecedented power over American industry," 48 U.S.L.W. at 5032, that this Court held to be contrary to Congress' intent in *Benzene*.

The present case illustrates the inadequacy of OSHA's approach. OSHA concluded that the Cotton Dust Standard would be economically feasible without relying on any study purporting to assess its costs. Instead, OSHA took the estimated cost figure of a less severe standard and, without warrant, treated it as the cost of its own far more stringent Standard. Relying on an unsupported "extreme assumption" regarding price-demand elasticity, it then concluded that a standard having such costs would not threaten the financial viability of the industry as a whole.

The economic limitation that OSHA purported to apply here is, in reality, no limitation at all. The qualified

and pragmatic language of the OSH Act reflects a congressional expectation that standard setting under the Act would be a more balanced exercise, in which the cost impact of regulatory action would play a more prominent role. Because the position of OSHA and the court below shows an utter disregard for the more pragmatic and balanced approach that Congress intended, and because it raises serious questions of an overbroad delegation of legislative authority, it must be rejected.

The judgment below also must be reversed because OSHA made no attempt to ascertain whether the benefits of its Standard (in the form of a claimed reduction in health risk) bear a reasonable relationship to the attendant costs. Both in its overall objectives and its more specific directives, the Act reflects a congressional intent that OSHA spend society's limited industrial hygiene resources wisely, so that employees can be protected, as far as possible, against the wide variety of health and safety risks in the workplace. This goal cannot be achieved if vast expenditures are mandated to achieve negligible reductions in risk. Consequently, OSHA must assess the significance of the reduction in risk expected from its standards in light of the costs of achieving that reduction.

The failure of OSHA to perform such an assessment is particularly egregious in the present case, because the petitioners had presented a far less costly alternative that promised to provide workers with health protection comparable to that expected from OSHA's far more burdensome Standard. Cotton dust, unlike benzene, is not a carcinogen, and byssinosis, the health impairment with which it is associated, is detectable in its early stages, when it is nondisabling and reversible. Consequently, the only material health impairment involved in the present case is much more easily averted than the malignant condition that was involved in *Benzene*. In these circumstances, OSHA's failure to perform a careful and re-

sponsible assessment of health protection benefits in light of the respective costs of the two alternatives requires reversal.

II.

The court below also erred in sustaining a provision of the Standard that requires employers to transfer and guarantee the wages of an employee who for any reason is unable to wear a respirator in circumstances where the Standard requires its use. This wage guarantee obligation—which is not tied to the existence of any health impairment—exceeds the authority that Congress conferred upon OSHA. The statute contains no express grant of such authority, and the legislative history of the OSH Act and provisions of related legislation demonstrate that Congress did not intend to confer such authority by implication.

ARGUMENT

I. THE COTTON DUST STANDARD IS PREDICATED UPON LEGALLY INSUFFICIENT CRITERIA FOR ASSESSING THE ANTICIPATED ECONOMIC IMPACT AND REDUCTION IN RISK THAT THE STANDARD IS EXPECTED TO PRODUCE.

The decision below permits OSHA to regulate in a manner that is essentially oblivious to considerations of cost, except in the very most extreme circumstances. The hallmark of OSHA's approach is a financial impact limitation that is wholly illusory and provides no constraint whatever on agency discretion. In Part I.A below, we show that this approach is both constitutionally questionable and at odds with the intent of Congress. OSHA is required to make a responsible prediction, supported by substantial evidence, of the economic impact that its standard will have and to explain why it believes that a standard having such an impact is feasible.

Moreover, as we show in Part I.B below, OSHA must responsibly assess the costs and risk reduction benefits of its standards in order to determine that employers are not being forced to incur enormous costs that bear no reasonable relationship to the health benefits expected to be achieved.

A. The Decision Below Mistakenly Permits OSHA To Adopt Health Standards That Are Subject to No Meaningful or Effective Cost-Related Limitations.

As its actions in the Benzene and Cotton Dust proceedings demonstrate, OSHA appears to believe that Congress left it free to impose enormously costly requirements *in the context of a single health standard*, as long as compliance *with that one standard* would not ruin an entire industry.[44] This position reflects OSHA's belief that Section 3(8) of the Act, which provides that occupational health standards should be "reasonably necessary or appropriate to provide safe or healthful employment," imposes no substantive restrictions on its standard-setting activities, and that Section 6(b)(5) mandates the creation of absolutely risk-free workplaces, subject only to technological limitations and the most attenuated economic constraints.

So construed, the Act imposes no meaningful or effective cost-related limitations upon OSHA's standard-setting authority. In such circumstances, industry cannot know what OSHA may do,[45] and effective judicial review is impossible.[46] In part because such an unconfined delegation of legislative power would raise constitu-

---

[44] *See Benzene*, 48 U.S.L.W. at 5030; Pet. App. at 67-69, 617 F.2d at 661-62.

[45] *See United States v. Rock Royal Co-Op., Inc.*, 307 U.S. 533, 574 (1939); *Panama Refining Co. v. Ryan*, 293 U.S. 388, 415 (1935).

[46] *American Power & Light Co. v. SEC*, 329 U.S. 90, 106 (1946).

tional problems,[47] this Court recently rejected OSHA's approach to standard setting in *Benzene*. As the plurality stated:

> [W]e think it is clear that the statute was not designed to require employers to provide absolutely risk-free workplaces wherever it is technologically feasible to do so, so long as the cost is not great enough to destroy an entire industry.

48 U.S.L.W. at 5031. The plurality continued: "[I]t is unreasonable to assume that Congress intended to give the Secretary the unprecedented power over American industry that would result from the Government's view of §§ 3(8) and 6(b)(5)." *Id.* at 5032.

In *Benzene*, the plurality limited OSHA's standard-setting authority to situations in which a "significant risk of material health impairment" would exist in the absence of the standard. *Id.* at 5030. But that threshold requirement standing alone will do little, if anything, to curb OSHA's power over American employers if the only cost-based restraint on OSHA's authority is that any single standard must not destroy an entire industry. In effect, the "sweeping delegation of legislative power" that the *Benzene* plurality avoided with respect to health risks will be presented with respect to costs.[48] The Act can and should be construed to avoid this result.[49]

---

[47] *See* U.S. Const. art. I, § 1; *A.L.A. Schechter Poultry Corp. v. United States*, 295 U.S. 495 (1935).

[48] In such circumstances, OSHA would be making the "crucial policy choices" that the Constitution reserves for Congress. *The Supreme Court, 1979 Term*, 94 Harv. L. Rev. 75, 242, 249 (1980).

[49] *See Benzene*, 48 U.S.L.W. at 5032. Where, as here, administrative regulation presents a "sharp break with our traditions," J. Freedman, *Crisis and Legitimacy* 84-85 (1978), this Court has strictly scrutinized the statutory grant claimed to authorize the action in question and has upheld the action only if authorized

Just as OSHA was required by the *Benzene* case to show that its standards address a significant health risk, the agency must also be required to identify and assess the economic impact of its standards on the basis of criteria that set some meaningful and effective limits on its standard-setting authority. As we now show, the economic feasibility test that OSHA and the court below applied here imposes no such limits on the agency's authority and departs from what Congress intended. Accordingly, the judgment of the court below must be reversed.

1. *OSHA Failed To Make a Responsible and Supportable Estimate of the Costs of Its Standard or To Apply Any Meaningful Criteria in Assessing the Standard's Economic Impact.*

A fundamental and dispositive consideration in this case is that OSHA did not support the Cotton Dust Standard with any study or analysis purporting to assess its costs. One cost analysis, a $1.1 billion estimate prepared by OSHA's contractor, RTI, was in the record, but OSHA rejected it out of hand.[50] Apparently OSHA be-

---

clearly and unmistakably. *See, e.g., Kent v. Dulles*, 357 U.S. 116, 128-30 (1958); *National Cable Television Ass'n, Inc. v. United States*, 415 U.S. 336, 342 (1974); Stewart, *The Reformation of American Administrative Law*, 88 Harv. L. Rev. 1667, 1697 (1975) (advocating "a policy of narrow construction of statutory delegations").

[50] OSHA's principal objection was its contention that approximately 30% of the capital costs estimated by RTI were for controlling dust from equipment processing synthetic fibers in cotton blend mills. 43 Fed. Reg. at 27370. In fact, the Standard requires controls on such equipment, as long as that equipment is located in a work area where cotton is handled or processed, even though on other machines. *See* 29 C.F.R. § 1910.1043(b) (1979), Pet. App. at 2 (definition of "cotton dust" and "lint-free respirable cotton dust"). OSHA also was disturbed by RTI's assumption that all companies were presently in compliance with the previous standard. 43 Fed. Reg. at 27370. In fact, while some firms were already below the limit set by the previous standard, many others had not yet achieved that limit. *Id.* The record indicated that the industry would have

lieved that its Standard would be prohibitively expensive (and thus not economically feasible) if it cost as much as RTI estimated.[51] But the RTI estimate was the only analysis directed to the exposure limits OSHA actually adopted. Even OSHA recognized that if the RTI estimate were rejected, something else was needed. To fill the gap, OSHA treated the Hocutt-Thomas estimate of a far less stringent and less costly proposal as an appropriate estimate of the capital cost of the Standard it ultimately adopted. This treatment, accomplished in two steps, is utterly without justification.

First, OSHA announced its belief that the Hocutt-Thomas capital cost estimates of $550 million for exposure limits substantially above those ultimately adopted in the Standard were "overstatements." But the agency provided no rational explanation for this conclusion. Thus, OSHA observed that compliance with the final standard would be less costly than it would have been for the proposed standard. 43 Fed. Reg. at 27372, col. 3. While accurate, this observation sheds no light at all on why the Hocutt-Thomas capital cost estimate is likely to have been overstated, since the Hocutt-Thomas estimate did not relate to either the proposed or final standard. The balance of OSHA's rationale is equally

---

to incur more than $143 million in capital costs (above and beyond what RTI had estimated) just to comply with the previous standard. Ex. 69 at 3-6 (L. K. Fitzgerald).

[51] In fact, the RTI estimate of $1.1 billion was, if anything, unduly low, since it was presented in 1974 dollars and should have been increased by 40% (to $1.54 billion) to account for inflation in machinery and equipment costs between 1974 and June 1978 when the Standard was adopted. This increase is reflected in the Wholesale Price Index for Machinery and Equipment, which rose from 139.4 to 195.1 between 1974 and June 1978. Monthly Labor Review 114 (March 1975); *id.* at 94 (October 1978). RTI considered this Index to be a reliable guide to price increases for textile plants and equipment. *See* Ex. 6, No. 76 at C-20, Table C-12.

unpersuasive.[52] The fact is that OSHA was engaging in the sheerest speculation when it characterized the Hocutt-Thomas capital cost estimate as an "overstatement."

But only at this point did the real speculation begin. For OSHA then proceeded to announce that it would treat the Hocutt-Thomas estimate of the capital costs of a much less stringent standard as an appropriate estimate of the capital costs required to achieve the *much more stringent limits* required under its Standard. 43 Fed. Reg. at 27373. There is a certain elegance and simplicity in this leap of logic; however, there is absolutely no basis to support it.[53]

---

[52] Thus OSHA speculated that Hocutt and Thomas "*may* have included some equipment which is used exclusively for synthetics." 43 Fed. Reg. at 27372, col. 3 (emphasis added). Apart from the fact that this was merely a surmise on OSHA's part, the fact is that the Standard as adopted requires controls on most such equipment. *See* note 50 *supra*. OSHA also predicted that new production equipment would reduce the number of machines on which the Hocutt-Thomas estimate was based. No record support was cited for this prediction. And, even if it were true, the cost of such equipment, much of which would not be purchased in the absence of the Standard, would have to be added to the cost of compliance. In addition, OSHA complained that Hocutt and Thomas had not accounted for technological improvements in the four-year compliance period. No citation to the record supported this statement; nor was "technology" defined. Moreover, this vague generalization was flatly refuted by Hocutt's testimony that, for the next *seven* years, he saw little new dust control technology that would make compliance less expensive for the operations of spinning through weaving. Tr. 2388-93. Finally, OSHA stated that the Hocutt-Thomas estimate included some costs necessary to come into compliance with the pre-existing exposure limits. Such costs were properly included by Hocutt and Thomas, since they are part of the total costs that would have to be incurred to comply with a new standard. *See United Steelworkers of America, AFL-CIO-CLC v. Marshall*, [1980] OSH Dec. (CCH) 30329, 30418, 30429, 8 OSH Cas. (BNA) 1810, 1902, 1913-14 (D.C. Cir. Aug. 15, 1980) (MacKinnon, J., dissenting); Comments of the Council on Wage and Price Stability, Ex. 111 at 10.

[53] For example, Hocutt and Thomas estimated that the capital costs to achieve a 0.5 mg/m^3 limit in spinning would be only $17.8

What really occurred is quite simple. Confronted with one estimate (RTI) that demonstrated a lack of economic feasibility by any test and another (Hocutt-Thomas) that did not address the Standard actually adopted, OSHA proceeded to select the Hocutt-Thomas figure as being the less objectionable of the two, since it was more compatible with the result OSHA wished to achieve. 43 Fed. Reg. at 27373. But, even if Hocutt and Thomas did overestimate the costs of the less stringent proposal that they had analyzed, only by the most remarkable coincidence would the amount of that overestimate be equal to the additional costs required to attain the far more stringent limits of the Standard OSHA actually adopted. Such an approach to the determination of costs cannot be sustained, for it dispenses with substantial evidence and amounts to regulation by speculation.[54] The OSH Act requires something better.[55]

---

million. *See* Pet. App. at 152-156 (Hovan Hocutt). By contrast, RTI estimated that achieving a 0.2 mg/m^3 limit in spinning would cost $553.3 million. (This is derived by applying a process-by-process ratio to RTI's final total capital cost estimate for the operations of opening through spinning. *See* Ex. 6, No. 76 at I-15, V-17.) Thus, the only estimates in the record indicated that the Hocutt-Thomas figures would have to be increased by at least $535 million if it were to be applied to achieving a 0.2 mg/m^3 limit in spinning alone.

OSHA itself appeared to recognize that substantial costs beyond those estimated by Hocutt and Thomas would be required to achieve a 0.2 mg/m^3 limit in spinning. Thus, OSHA stated that a "major effort" would be necessary to attain this limit and observed that its decision to set a higher exposure level in weaving would permit the industry to "focus more resources on spinning operations" in order to make this "major effort." 43 Fed. Reg. at 27367, col. 2.

[54] *See Texas Independent Ginners Ass'n v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1216 & n.27; *cf. National Wildlife Fed'n v. Andrus*, 440 F. Supp. 1245, 1253 (D.D.C. 1977) (weighing of benefits and costs is impossible "where there is only speculation . . . concerning the impact upon the environment").

[55] 29 U.S.C. § 655(f). *See Benzene*, 48 U.S.L.W. at 5034 (plurality opinion); *American Petroleum Inst. v. OSHA*, 581 F.2d at 497;

OSHA's determination that the Standard would not threaten the economic viability of the industry as a whole was as flawed as its estimate of what the Standard would cost. In critical respects, this determination rested on what RTI characterized as the "extreme assumption" that the compliance costs of the Standard would be passed through in the price of cotton products.[56] RTI made this assumption (and OSHA and the court below accepted it)[57] without any support, analysis or explanation—even though, as RTI recognized, the Standard would reduce profits and return on investment in the textile industry to very low or negative levels if the increased costs could not be passed on in product prices. Pet. App. at 143.

Industrial Union Dep't, AFL-CIO v. Hodgson, 499 F.2d at 474.

The extreme to which OSHA will go if permitted to regulate as it has in the present case is also well illustrated in the Lead Standard proceeding. 43 Fed. Reg. 52952 (1978); 43 Fed. Reg. 54354 (1978). In that case, OSHA proposed a PEL of 100 ug/m^3, and the record contained several studies estimating the cost of achieving such a standard. However, the final standard established a PEL of only 50 ug/m^3, and OSHA stated that compliance with the final standard "would not result in undue economic hardship" to the affected industries. *Id.* at 54496, col. 3. OSHA reached this conclusion even though it "did not undertake a formal analysis of cost of compliance with the 50 ug/m^3 PEL," and even though it admittedly lacked sufficient information to make a "meaningful quantification of cost" for any standard stricter than the one it had proposed. *Id.* Instead, it simply utilized the compliance cost estimate prepared for the proposed 100 ug/m^3 standard as the basis for determining the economic feasibility of the 50 ug/m^3 standard that it actually adopted. On review, the D.C. Circuit held this to be a sufficient basis for establishing economic feasibility. *United Steelworkers of America, AFL-CIO-CLC v. Marshall*, [1980] OSH Dec. (CCH) at 30394-95, 30398-401, 30402-03, 8 OSH Cas. (BNA) at 1877-78, 1881-83, 1885-87.

[56] *See* pages 13, 16-17 *supra*.

[57] 43 Fed. Reg. at 27370; Pet. App. at 67 & n.145, 617 F.2d at 661 & n.145.

In fact, there was little basis for RTI's "extreme assumption." To the contrary, the evidence of record suggested that competitive constraints (including inroads made by foreign competition) would preclude the passing on of full compliance costs in product prices,[58] and neither RTI nor OSHA presented evidence or analysis that would support a contrary conclusion. As the Fifth Circuit recently observed in setting aside the application of OSHA's Cotton Dust Standard to the ginning industry, the Act requires that OSHA's findings be based on substantial evidence rather than "on assumptions without an adequate evidentiary basis." *Texas Independent Ginners Association v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1220.

Even accepting this extreme assumption, however, RTI and others expressed great concern about the ability of many textile firms to raise the capital needed to install controls sufficient to achieve a 0.2 mg/m^3 exposure limit. If the controls were phased in over an eight-year period (rather than the four years ultimately allowed), RTI expected that the Standard would precipitate some plant closures.[59] OSHA joined in this conclusion, acknowledging that the Standard would result in the shutdown of a number of employers and would cause greater concentration in the industry.[60] Indeed, OSHA observed that RTI had probably underestimated

---

[58] The record showed that cotton's share of total domestic fiber sales dropped from over 70% in 1947 to only 30% in 1974, largely as a result of foreign competition and the availability of synthetic yarns. Pet. App. at 147-48. And this competition was shown to be continuing, with imports growing at a rate of about 6-7% a year for products covered by multilateral trade agreements. *Id.* at 148, 150-51; *see also* Tr. 2565-71 (Mr. John P. Figh).

[59] Ex. 6, No. 76 at VI-125-29; Tr. 561-63 (Dr. LeSourd).

[60] 43 Fed. Reg. at 27378, col. 2. In fact, the impact necessarily would be more severe than OSHA presumed, since RTI had assumed that the capital costs would be incurred over an eight-year period. The Standard shortened this to four years, but OSHA took no account of the added economic impact that would result.

the financial impact that the Standard would have on smaller firms, since compliance with the Standard by such firms would require an investment of more capital per unit of production than in the case of larger firms. 43 Fed. Reg. at 27378, col. 2.

In sum, OSHA's estimate of the costs of the Standard reflects bald assertions and outright speculation; its assessment of the economic impact of the Standard was based on an extreme and unsupported assumption that the agency applied to these speculative costs; and it acknowledged that, even so, the Standard would result in plant closures and further concentration in the industry. How much of the industry would be forced to close and what impact this would have on employment and competitive conditions are matters that OSHA failed to address in any concrete manner. Instead, on the basis of the foregoing findings, OSHA declared the Standard to be "generally feasible." *Id.* The court below upheld this determination, stating that "changes in the market structure of the industry do not signify economic infeasibility," so long as "the standard will not put the industry out of business." Pet. App. at 68-69 & n.148, 617 F.2d at 662 & n.148.

ATMI submits that this approach effectively imposes no constraint whatsoever on OSHA's standard-setting authority. Rather, it allows OSHA to exercise enormous, unstructured and "unprecedented power over American industry." *Benzene*, 48 U.S.L.W. at 5032 (plurality opinion).[61] As we show below, the language of the OSH Act and its legislative history demonstrate that Congress

---

[61] The lengths to which OSHA and some courts may go under the approach followed in the recent case is illustrated by the Lead Standard proceeding. In that case, the D.C. Circuit found that OSHA's Lead Standard would be economically feasible for the battery manufacturing industry even if it forced 200 small producers out of business, since OSHA could still find that competition would survive, through the existence of 30 firms that already controlled 90% of the market. *United Steelworkers of America, AFL-CIO-CLC v. Marshall*, [1980] OSH Dec. (CCH) at 30403, 8 OSH Cas. (BNA) at 1886-87.

intended that OSHA standards would have to satisfy a more exacting test of economic feasibility than was applied in this case.

2. *OSHA's Construction of the Act—Under Which the Costs of a Standard Are Irrelevant Short of the Point at Which They Threaten To Ruin an Entire Industry—Is Inconsistent with the Statutory Language and Legislative History.*

As this Court recognized in *Benzene*, the language of the OSH Act is not focused solely upon the promotion of worker health and safety to the exclusion of other concerns.[62] The mere fact that compliance costs are not "great enough to destroy an entire industry" does not mean that a standard comports with the requirements of the Act. 48 U.S.L.W. at 5031 (plurality opinion). To the contrary, "Congress did not intend OSHA to reduce each significant hazard without regard to economic consequences . . . short of serious dislocation." *Id.* at 5038 n.5 (Powell, J., concurring).

The overall objective of the Act, as set forth in Section 2(b), is to assure safe and healthful working conditions, "so far as possible." 29 U.S.C. § 651(b). And, pursuant to Section 3(8), an occupational health standard may require only such conditions, practices, and operations as are "reasonably necessary or appropriate to pro-

---

[62] The qualified and pragmatic language of the OSH Act stands in sharp contrast to the unqualified language of such statutory provisions as the Endangered Species Act of 1973, 16 U.S.C. § 1536(a)(2) (Supp. III 1979), and the Delaney Clause of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 348(c)(3)(A) (1976). In relevant part, the Endangered Species Act unqualifiedly prohibits the funding of projects that would "jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of habitat of such species . . . ." The Delaney Clause states unequivocally that "no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal."

vide safe or healthful employment and places of employment." As noted by the plurality in *Benzene*, a workplace can be "safe" within the meaning of Section 3(8), even though it is not entirely risk-free. 48 U.S.L.W. at 5031.[63] Similarly, as Professor Currie points out:

> What is "appropriate" [within the meaning of Section 3(8)] may be what is desirable in light of feasibility or cost; what is "reasonably necessary" may be what is both necessary and reasonable.[64]

Like Sections 2(b) and 3(8), the standard-setting provisions of Section 6 are qualified and relative in nature. Thus, Section 6(b)(5) provides that occupational health standards are to protect—not absolutely—but only "most adequately" against the health hazard to which the standard is directed. The requirements that protection be provided only "to the extent feasible" and only against "material impairment" are further pragmatic limitations. This language reflects the inevitable fact that there are some risks that it will not be "feasible" to eliminate or reduce and, as the *Benzene* plurality recognized, 48 U.S.L.W. at 5033, others that must be disregarded as not "material," if employees are to receive the most adequate overall protection against all workplace hazards.

The legislative history of Section 6(b)(5) confirms the qualified nature of the statutory language. Thus, Senator Javits, the author of the original Administration bill (S. 2788), took the position that OSHA standards should be "feasible" in the sense of being "reasonable" and "practical" as well as technologically achievable. His

---

[63] *Cf.* Currie, *OSHA*, 1976 Am. B. Foundation Research J. 1107, 1134 (1976) (the terms "safe or healthful" allow "room for some play"). EPA also has recognized that "use of the term 'safety' [does not] necessarily imply a zero-risk concept." 44 Fed. Reg. 58642, 58660, col. 3 (1979).

[64] Currie, *supra* note 63, at 1134.

original bill would have required the submission to an independent board of what Senator Javits described as "a report on the feasibility of the proposed standards." [65] "Feasibility" for the purpose of such standard setting was defined as including "the technical feasibility, reasonableness and practicality of such standard." [66] This "feasibility report" was to be considered by the independent board, along with other record evidence, in formulating its standards.[67]

The Senate Committee rejected the concept of an independent board but agreed that "standards promulgated under Section 6(b) shall represent feasible requirements." Leg. Hist. at 147. Accordingly, the term "feasibly" was added to Section 6(b)(5) by the Committee and remained in the version passed by both Houses, thereby satisfying the concern of Senator Javits and others that standards be reasonable and practical.[68]

The substitution of the phrase "material" for "any" impairment of health responded to a similar concern that OSHA might seek to establish a risk-free utopia regardless of cost. Leg. Hist. at 480 (remarks of Sen-

---

[65] 115 Cong. Rec. 22517, col. 3 (1969).

[66] S. 2788, 91st Cong., 1st Sess. § 4(c) (1969), *reprinted in* Leg. Hist. at 38-39.

[67] *Id.* § 4(c)(2), (3), *reprinted in* Leg. Hist. at 39-40.

[68] Senator Dominick supported Senator Javits' attempt to include a feasibility limitation. However, he was concerned that the placement of the term "feasibly" in the Committee bill might still be read to require that an occupation be banned if there remained "*some* risk of injury, impaired health, or life expectancy." Leg. Hist. at 367. He attempted to cure this problem by relocating the feasibility requirement to the position that it occupies in Section 6(b)(5) as enacted. *See Benzene*, 48 U.S.L.W. at 5033 n.53. As Senator Dominick explained: "What we were trying to do in the bill . . . was to say that when we are dealing with toxic agents or physical agents, we ought to take such steps as are feasible and practical to provide an atmosphere within which a person's health or safety would not be affected." Leg. Hist. at 502.

ator Dominick). Substituting "material" for "any" was part of an effort to achieve a more "balanced" bill, so that, in the words of Senator Saxbe, OSHA health standards would not amount to "harassing measures that would, in effect, limit production in areas that are not necessarily going to increase safety." *Id.* at 321.[69]

The legislative compromise that resulted in the imposition of the "substantial evidence" requirement in Section 6(f) of the Act, 29 U.S.C. § 655(f), also is indicative of Congress' concern that enormous costs not be imposed to produce insignificant benefits.[70] This compromise, as the Fifth Circuit has observed,

> accommodated the Senate's desire for administrative convenience and flexibility by accepting informal rulemaking procedures, but placated House concern for protection of employers from arbitrary burdens imposed by a massive federal bureaucracy, [by] adopting the substantial evidence test for judicial review.[71]

In short, the legislative history of the OSH Act reflects Congress' belief "that it was enacting a fair and reasonable bill that balanced the needs of workers and indus-

---

[69] As noted in a recent comment, the legislative history of the amendment that added the word "material" to Section 6(b)(5) suggests "that risks that could not be eliminated cost efficiently were also meant to be excluded from OSHA regulation." *The Supreme Court, 1979 Term*, 94 Harv. L. Rev. at 247.

[70] Unless the "substantial evidence" test were substituted for the more lenient "arbitrary and capricious" standard, many in Congress feared that OSHA would be free to impose unjustified burdens. *See* Leg. Hist. at 343-44 (remarks of Senator Cook). As part of the compromise, OSHA was permitted to act through informal rulemaking procedures.

[71] *Florida Peach Growers Ass'n v. Department of Labor*, 489 F.2d 120, 128 (5th Cir. 1974) (citing *Associated Indus. of New York State, Inc. v. Department of Labor*, 487 F.2d 342 (2d Cir. 1973)).

try." [72] It clearly shows the congressional concern that some meaningful and effective economic limitations be placed upon OSHA's standard-setting authority. Without such limitations, it would be impossible to ensure that the legislation was balanced or that OSHA standards would be "neither oppressive nor needlessly costly and without unjustified harassment of management." [73] The open-ended affordability test applied by OSHA and the court below—under which costs are irrelevant short of the point at which destruction of an entire industry is threatened—does not comport with the intent of Congress.

Rather, OSHA must present a responsible prediction, supported by substantial evidence, of what its standard will cost and what impact it will have on such factors as production, employment, competition, and prices.[74] And the agency must explain in a cogent manner—on the basis of intelligible criteria—why it concludes that a standard having such an economic impact is "feasible." OSHA's performance in the present case falls far short of satisfying such a test. For that reason alone, the judgment below must be reversed. Moreover, as shown below, the Cotton Dust Standard must be set aside because OSHA made no attempt to determine whether the Standard would produce a reduction in risk that is significant when considered in light of the attendant costs.

---

[72] *The Supreme Court, 1979 Term*, 94 Harv. L. Rev. at 248.

[73] Leg. Hist. at 1091 (remarks of Congressman Randall). This concern for balanced legislation was a consistent theme. *See, e.g., id.* at 320-21 (remarks of Senator Saxbe); *id.* at 433 (remarks of Senator Williams); *id.* at 1143 (remarks of Senator Javits); *id.* at 1150 (remarks of Senator Eagleton).

[74] *See Texas Independent Ginners Ass'n v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1223 ("OSHA's estimate of the anticipated cost and expected benefit of proposed regulations are factual findings that must be supported by substantial evidence in the record").

B. The Decision of the Court Below Should Be Reversed Because OSHA Did Not Show That the Standard Was Likely To Achieve a Reduction in Risk That Is Significant When Considered in Light of Its Costs.

In Part I.A above, we showed that the extravagantly expansive concept of OSHA's standard-setting power embraced by the court below cannot be maintained as a constitutional or statutory matter. In this part, we discuss an alternative construction of the Act that more faithfully reflects the congressional intent that society's limited industrial hygiene resources be spent wisely —so that vast sums are not squandered on measures that produce no significant health protection for workers. Because OSHA acted in disregard of this congressional expectation, the Cotton Dust Standard must be set aside.

1. *OSHA Is Required To Show That a Reasonable Relationship Exists Between the Risk Reduction Benefits and the Costs of Its Standards.*

The language of the OSH Act, as construed by this Court in *Benzene*, requires OSHA to show that its standard will produce a significant reduction in the risk of material health impairment. Such a showing must reflect an assessment of the costs and benefits of the standard (and of available alternatives) sufficient to permit OSHA to determine that the risk reduction benefits of the standard bear a reasonable relationship to its costs. This construction is consistent with the weight of pertinent judicial and administrative precedent under the OSH Act and analogous health and safety legislation.

a. *The OSH Act as Construed in* Benzene

In *Benzene*, the plurality construed the qualified and pragmatic language of the OSH Act to reflect Congress' intent that OSHA not be permitted to make exorbitant

and excessive demands upon the limited resources of American employers in a quixotic effort to eliminate all incremental risks from the workplace. To give effect to these pragmatic congressional concerns, the *Benzene* plurality limited the exercise of OSHA's standard-setting authority to situations where the agency shows that its standard can achieve "significant benefits" in the form of a reduction in the risk of material health impairment. 48 U.S.L.W. at 5032. As Mr. Justice Powell put it, OSHA must show that its standard would "significantly reduce the hazard." *Id.* at 5037 (Powell, J., concurring).

Requiring OSHA to show that its standard is likely to produce a significant reduction in the risk of material health impairment is the necessary and logical complement to the requirement that the agency demonstrate, in the first instance, that its standard is addressed to a significant health risk. It would make no sense to permit OSHA to mandate the expenditure of vast sums that will result in no substantial reduction in the risk of material health impairment. Thus, the requirement that OSHA "consider differences in degrees of significance rather than simply a total elimination of all risk," *id.* at 5031 n.48 (plurality opinion), is a critical element in the overall statutory scheme.

If OSHA were free to disregard the extent of risk reduction that its standards would achieve, the agency, as the *Benzene* plurality noted, would possess "the power to impose enormous costs that might produce little, if any, discernible benefit." *Id.* at 5032. A standard that consumes enormous resources to produce a negligible reduction in risk is not "reasonably necessary or appropriate to provide safe or healthful employment," as required by Section 3(8) of the Act, or "feasible" within the meaning of Section 6(b)(5). By contrast, a standard that produces even a very small reduction in a significant risk of material health impairment may well satisfy

the requirements of Sections 3(8) and 6(b)(5) if its cost is relatively low.[75]

The critical point is that, pursuant to the rationale of the *Benzene* plurality, OSHA cannot validly adopt a health standard without showing both that the standard addresses a *significant risk* of material health impairment and that the standard is expected to achieve a *significant reduction in that risk.* And the determination of whether a reduction in risk is "significant" must reflect an assessment of the costs of achieving it. Otherwise, OSHA would be free to impose on employers the arbitrary burdens—costing much and accomplishing little—that Congress clearly meant to avoid. "It seems unlikely that Congress . . . intended to require massive expenditures to obtain small benefits whenever the expenditures could be made without bankrupting industries." [76]

If a reduction in risk were automatically deemed significant as long as the costs of achieving it would not produce massive dislocation, OSHA could not possibly discharge its overriding statutory obligation to protect workers "so far as possible." For, under such an approach, OSHA could require an industry to incur compliance costs up to the very limit of "affordability" (wherever that point might lie in OSHA's judgment) in order to achieve a negligible reduction in the risk addressed by *a single health standard,* while other more substantial risks would perforce remain unaddressed for lack of resources. OSHA itself should be keenly aware

---

[75] For example, a standard that is expected to reduce the number of deaths in the workplace from ten per year to nine per year might well be deemed to satisfy the requirements of Sections 3(8) and 6(b)(5) if it cost only $100,000, but might not be thought to satisfy the requirements of those statutory provisions if it cost $1 billion. In the former instance, the reduction in risk could be deemed significant in light of the costs, whereas in the latter instance it might not. *See The Supreme Court, 1979 Term,* 94 Harv. L. Rev. at 247.

[76] *Id.* at 248-49.

of this problem, since it already has identified more than 200 substances that it considers to be candidates for regulation as workplace carcinogens pursuant to its Cancer Policy.[77]

In sum, OSHA must demonstrate that its standards are reasonably necessary or appropriate to achieve a significant reduction in the risk of material health impairment. Such a determination must reflect an assessment of costs and risk reduction benefits sufficient to permit OSHA to conclude that there is a reasonable relationship between the two.[78] Unless such an assessment is made, OSHA's standards inevitably will result in

> a serious misallocation of resources and a lower effective level of safety than could be achieved under standards set with reference to the comparative benefits available at a lower cost.

Id. at 5038 (Powell, J., concurring).

This does not mean that OSHA must engage in a rigidly formal cost-benefit calculation that places a dollar value on employee lives or health.[79] Assessing the benefits of a standard in light of its costs does not require that a value be assigned to worker life or health; nor does such an assessment predetermine the decisions that OSHA must make. Rather, as the court below recognized, it permits the agency to engage in a " 'systematic

---

[77] *See* 45 Fed. Reg. 53672 (Aug. 12, 1980). In addition, the National Institute for Occupational Safety and Health has published a list of 2,590 substances in its Tumorigenic Citations Subfile of the Registry of Toxic Effects of Chemical Substances (Oct. 1979). *See also Benzene*, 48 U.S.L.W. at 5032 (noting "that there are literally thousands of substances used in the workplace that have been identified as carcinogens or suspect carcinogens").

[78] *See The Supreme Court, 1979 Term*, 94 Harv. L. Rev. at 249 (OSH Act should be construed to require a showing "that the benefits of a regulation bear a reasonable relationship to its costs").

[79] *See Texas Independent Ginners Ass'n v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1222 n.44.

analysis and evaluation of alternative courses of action.'" Pet. App. at 69-70 n.152, 617 F.2d at 662 n.152 (citation omitted). And it allows the agency (and the public) to ensure that society's limited industrial hygiene resources are not being squandered or misallocated in a fashion that produces very little health benefit and that provides workers with less overall protection than might otherwise be possible.[80]

The nature of the exercise in which OSHA must engage was adumbrated in *Benzene*. First, OSHA must make a responsible determination of the costs and risk reduction benefits of its standard. Pursuant to the requirement of Section 6(f) of the Act, this determination must be factually supported by substantial evidence in the record. The subsequent determination whether the reduction in health risk is "significant" (based upon the factual assessment of costs and benefits) is a judgment to be made by the agency in the first instance.[81] Although a court might well be reluctant to second guess the agency's judgment on the question of significance, the mere fact that OSHA is obligated to make such a determination, based upon an assessment of costs and benefits, will have a salutary effect on the agency's decisionmaking process.

For one thing, engaging in such an assessment will lead OSHA to reject control strategies the costs of which

---

[80] Of course, life and health-protective resources are not unlimited, and compliance with OSHA standards is not the only cost industry must bear. As noted in *Making Prevention Pay*, Final Report of the Interagency Task Force on Workplace Safety and Health VII-15 (Dec. 14, 1978) (footnotes omitted):

> The cost of complying with OSHA is only part of the cumulative impact of Federal regulation on individual firms and their industries. There is growing concern that these cumulative impacts are costing jobs and draining substantial investment from new efforts at industrial innovation, while adding perhaps 3/4 of 1% to the yearly rate of inflation.

[81] *See Benzene*, 48 U.S.L.W. at 5034, 5035 n.62 (plurality opinion).

are grossly disproportionate to their benefits. It also will cause the agency to give some consideration to the impact that its standard would have on the industry's ability to address other, more significant health and safety risks in the future—including risks that OSHA anticipates will be addressed in standards that are at least in the planning stage.[82] Finally, forcing OSHA to engage in such an assessment and to explain the determination it has reached provides a potential legislative check on what might otherwise amount to the exercise of virtually untrammeled authority. It will allow for correction, through the political process, of actions that are deemed by the Congress to be extreme, unwarranted, and inconsistent with congressional intent.[83]

b. *Judicial and Administrative Precedent*

While the courts of appeals have not been unanimous in requiring that OSHA standards reflect a careful assessment of risk reduction benefits in light of costs, the weight of relevant precedent decidedly favors such a construction of the Act. Before the decision below, only one case had considered explicitly the nature of the economic impact assessment that is required in order for OSHA to comply with Section 3(8) as well as Section 6(b)(5) of the Act. *American Petroleum Institute v. OSHA*, 581 F.2d 493 (5th Cir. 1978). That decision, reviewed by this Court in *Benzene*, construed Sections 3(8) and 6(b)(5) as requiring OSHA to assess the expected health protection benefits of its standards in light of the cost burdens to be imposed and to show that the benefits

---

[82] A contrary reading of the Act "could force the depletion of an industry's resources in an effort to reduce a single risk by some speculative amount, even though other significant risks remain unregulated." *Id.* at 5038 & n.7 (Powell, J., concurring).

[83] *See Amalgamated Meat Cutters & Butcher Workmen v. Connally*, 337 F. Supp. 737, 758-59 (D.D.C. 1971) (3-judge court) (Leventhal, J.); *cf. Yakus v. United States*, 321 U.S. 414, 426 (1944).

bear a reasonable relationship to the costs. 581 F.2d at 504. A different panel of the Fifth Circuit recently vacated the Cotton Dust Standard as it applied to the ginning industry because, among its other failings, OSHA did not show that such a reasonable relationship existed in that case. *Texas Independent Ginners Association v. Marshall*, Nos. 78-2663, *et al.*, slip op. at 1224-25.

The Courts of Appeals for the Sixth and Seventh Circuits have interpreted the term "feasible" to reach a similar result. Thus, in *RMI Co. v. Secretary of Labor*, 594 F.2d 566, 573 (6th Cir. 1979), the Sixth Circuit rejected the notion that controls required by an OSHA standard are "necessarily . . . economically feasible merely because the employer can easily (or otherwise) afford them." Rather, according to the court, the expenditures required by a standard are economically feasible only if OSHA demonstrates that there is "reasonable assurance that there will be an appreciable and corresponding improvement in working conditions." *Id.* Accordingly, the Sixth Circuit insisted that OSHA

> weigh the costs of compliance against the benefits expected to be achieved thereby in order to determine whether the proposed remedy is economically feasible.

Id.

In *Turner Co. v. Secretary of Labor*, 561 F.2d 82, 86 (7th Cir. 1977), the Seventh Circuit construed the term "feasible" in the same way, concluding that required controls could not be deemed feasible without determining "whether the health benefits to employees . . . justify the cost." Such a construction of the term "feasible," the court noted, was "in accordance with the clear intent of Congress and the purpose of the Occupational Safety and Health Act." *Id.* at 85.[84] Thus, the decision

---

[84] In *Marshall v. West Point Pepperell, Inc.*, 588 F.2d 979, 981 n.3 (5th Cir. 1979), the Fifth Circuit observed that the *Turner* decision "certainly comports with the plain import of the term feasible."

below is inconsistent with the weight of the most directly relevant judicial precedent.[85]

It is also inconsistent with judicial interpretations of similiar language in other statutes. For example, courts have construed the provision of the Consumer Product Safety Act authorizing the adoption of rules "reasonably necessary to eliminate or reduce an unreasonable risk of injury" [86] to require the agency to assess the expected benefits in light of the burdens to be imposed by the standard.[87] Prior to the *Benzene* decision, OSHA took the position that this construction of the Consumer Product Safety Act did not apply to the OSH Act, since the Consumer Product Safety Act is addressed only to "unreasonable risks," while, in OSHA's view, the OSH Act required the elimination of *all* risks of material health impairment, whether or not they are so significant as to be unreasonable. However, this position was rejected in *Benzene*, where the OSH Act was construed as limiting OSHA to addressing only *significant* risks in its standards. Consequently, the distinction that OSHA and the court of appeals, *see* Pet. App. at 71-72 n.159, 617 F.2d

---

[85] Admittedly, other courts have taken a more restrictive approach to the concept of economic feasibility. *See American Iron & Steel Inst. v. OSHA*, 577 F.2d 825 (3d Cir. 1978), *cert. granted*, 48 U.S.L.W. 3855 (U.S. July 2, 1980), *cert. dismissed*, 49 U.S.L.W. 3145 (U.S. Sept. 10, 1980); *Industrial Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467 (D.C. Cir. 1974). However, prior to the decision below, only the Third Circuit in *American Iron & Steel Institute* had limited economic feasibility to an affordability test in an action brought by employers to challenge the validity of an OSHA standard.

Another panel of the D.C. Circuit has since followed the construction of the Act adopted by the court below. *United Steelworkers of America, AFL-CIO-CLC v. Marshall*, [1980] OSH Dec. (CCH) 30329, 8 OSH Cas. (BNA) 1810 (D.C. Cir. Aug. 15, 1980).

[86] 15 U.S.C. § 2058(c)(2)(A) (1976).

[87] *Aqua Slide 'N' Dive Corp. v. CPSC*, 569 F.2d 831 (5th Cir. 1978). *Accord, D.D. Bean & Sons v. CPSC*, 574 F.2d 643 (1st Cir. 1978); *cf. Forester v. CPSC*, 559 F.2d 774, 789 (D.C. Cir. 1977).

at 663 n.159, drew between the Consumer Product Safety Act and the OSH Act can no longer be maintained.[88]

The decision below is also at odds with the long-standing position of the Occupational Safety and Health Review Commission ("OSHRC"), the agency charged by Congress with responsibility for deciding enforcement proceedings under the Act.[89] In *Continental Can Company*, [1976-1977] OSH Dec. (CCH) 25250, 25256, 4 OSH Cas. (BNA) 1541, 1547 (1976), OSHRC interpreted the term "feasible" to require that "all the relevant costs and benefits [be] weighed."[90] OSHRC has ad-

---

[88] Absent an express bar, other health and safety statutes also have been read to require consideration of risk, benefit and cost evidence. Thus, the section of the National Traffic and Motor Vehicle Safety Act providing for the adoption of "reasonable, practicable and appropriate" traffic safety standards, 15 U.S.C. § 1392 (f) (3) (1976), has been construed as requiring the Secretary of Transportation to "identif[y] some of the costs associated with the proposal and determine[] that these costs are overridden by reasonably predictable benefits." *H & H Tire Co. v. Department of Transportation*, 471 F.2d 350, 356-57 (7th Cir. 1972) (Stevens, J., concurring opinion adopted by the court) (footnotes omitted). Similarly, the Federal Water Pollution Control Act provision directing that EPA's 1983 effluent limitation guidelines reflect "the best available technology economically achievable," 33 U.S.C. § 1311(b) (2) (A) (1976 & Supp. III 1979), has been held to require consideration by EPA of "the benefits derived from the application of its effluent reduction requirements." *Appalachian Power Co. v. Train*, 545 F.2d 1351, 1361 (4th Cir. 1976). *Accord, National Crushed Stone Ass'n, Inc. v. EPA*, 601 F.2d 111, 122-23 (4th Cir. 1979), *cert. granted*, 48 U.S.L.W. 3535 (U.S. Feb. 19, 1980).

[89] *See* Section 12 of the Act, 29 U.S.C. § 661; Leg. Hist. at 462.

[90] In *Continental Can*, OSHA couched its argument in the very terms embraced by the court below in the present case, claiming that Section 6(b) (5) "requires employers to expend funds for each and every health hazard whether life threatening or not without limit so long as the expenditures for each hazard can be borne without putting the employers' financial condition in jeopardy." [1976-1977] OSH Dec. (CCH) at 25256, 4 OSH Cas. (BNA) at

hered to this view in subsequent decisions.[91]

As these decisions indicate, there is nothing novel in suggesting that an agency should develop and consider information relating to the expected benefits and costs of its proposed actions. To the contrary, the experience of numerous federal agencies (including OSHA itself) demonstrates that assessing the costs and benefits of regulatory action is both a commonplace and extremely useful exercise. Perhaps the best example of this is the experience of the Environmental Protection Agency ("EPA"), which routinely conducts risk assessments for carcinogenic substances, an exercise that, in EPA's view, represents "a significant step toward the objective of achieving real benefits in improved public health while avoiding the burdens of undesirable regulatory action." 41 Fed. Reg. 21402, 21402-03 (1976).

More recently, under Section 112 of the Clean Air Act, 42 U.S.C. § 7412 (Supp. III 1979), EPA proposed a policy for identifying and regulating airborne substances posing a risk of cancer (the "Air Cancer Policy"). 44 Fed. Reg.

1547. OSHRC rejected OSHA's position as being "inconsistent with the intent of Congress" and observed:

> Clearly, employers have finite resources available for use to abate health hazards. And just as clearly if they are to be made to spend without limit for abatement of this hazard their financial ability to abate other hazards, including life threatening hazards, is reduced.

Id.

[91] *See Castle & Cooke Foods*, [1977-1978] OSH Dec. (CCH) 26325, 5 OSH Cas. (BNA) 1435 (1977), *appeal docketed*, No. 77-2565 (9th Cir. July 14, 1977); *Great Falls Tribune Co.*, [1977-1978] OSH Dec. (CCH) 26303, 5 OSH Cas. (BNA) 1443 (1977), *appeal docketed*, No. 77-2566 (9th Cir. July 14, 1977); *West Point Pepperell, Inc.*, [1977-1978] OSH Dec. (CCH) 26136, 5 OSH Cas. (BNA) 1257 (1977), *aff'd, Marshall v. West Point Pepperell, Inc.*, 588 F.2d 979 (5th Cir. 1979); *KLI, Inc.*, [1977-1978] OSH Dec. (CCH) 26935, 6 OSH Cas. (BNA) 1097 (1977).

Most recently, in *Samson Paper Bag Co.*, [1980] OSH Dec. (CCH) 30038, 30044 (1980), the three OSHRC Commissioners

58642 (1979). Section 112 of the Clean Air Act requires EPA to establish national emission standards for hazardous air pollutants at a level that "provides an ample margin of safety to protect the public health." 42 U.S.C. § 7412(b)(1)(B). If anything, this language would appear to be less qualified and more singleminded in its focus on health protection than the language of Sections 3(8) and 6(b)(5) of the OSH Act. Yet EPA has stated that Section 112 was not intended to require "the complete elimination of all risks," but rather permits the agency to "consider other social and economic factors [including the cost of reducing the risks further] in determining whether an ample margin of safety is provided by a given control level." 44 Fed. Reg. at 58661, col. 1. Other agencies, including the Food and Drug Administration and the Consumer Product Safety Commission, also utilize risk estimation procedures to guide their regulatory decisions.[92]

OSHA itself performs cost and benefit assessments. As noted in *Benzene*, 48 U.S.L.W. at 5031, OSHA engages in cost-benefit analysis in determining priorities for regulation under Section 6(b)(5), an exercise that OSHA believes is essential to ensure that it allocates its resources in a reasonable and efficient manner.[93] If such an analysis is appropriate in order to ensure that OSHA's resources are not misallocated, its use surely is vital to

---

were divided, but two Commissioners agreed to remand the case for further proceedings consistent with *Continental Can*. *See id.* at 30045 (Commissioner Barnako); *id.* at 30046 (Chairman Cleary).

[92] For example, under Section 406 of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 346 (1976), FDA conducted a risk assessment to assist it in setting a tolerance level for aflatoxin in consumer peanut products, 43 Fed. Reg. 8808 (1978), and the Consumer Product Safety Commission developed a quantitative risk estimate for benzene in connection with its proceedings for regulating that substance. 43 Fed. Reg. 21838, 21845 (1978).

[93] *See also National Congress of Hispanic Am. Citizens v. Marshall*, 626 F.2d 882 (D.C. Cir. 1979).

ensure that the much greater societal resources committed under OSHA standards are not misallocated. Moreover, eleven months after the Standard was promulgated, OSHA prepared and submitted to Congress a lengthy and detailed cost-effectiveness/cost-benefit analysis for the Cotton Dust Standard itself.[94]

As can be seen from the foregoing discussion, the "experience gained under the [OSH Act] and other health and safety laws," 29 U.S.C. § 655(b)(5), further confirms the importance and usefulness of performing a responsible cost and benefit assessment in the setting of occupational health standards.[95] Because OSHA failed to perform such an assessment here, it could not determine that the Cotton Dust Standard is reasonably necessary or appropriate to achieve a reduction in risk that is significant in light of its enormous costs. The failure of the court below to require OSHA to perform such an assessment and to make such a determination requires reversal.

---

[94] The Report was not part of the rulemaking proceeding, was not submitted for industry comment, was not before the court of appeals, and, as OSHA acknowledges, "does not reflect the decision-making process used to promulgate the final standard." Department of Labor Report to the Congress, *Cotton Dust: Review of Alternative Technical Standards and Control Technologies*, at v (May 14, 1979) [hereinafter "Cotton Dust Report to Congress"]. Accordingly, the Report cannot be relied upon by OSHA to support the Cotton Dust Standard. While ATMI does not agree with many of the assumptions employed, the methods followed, or the conclusions reached in the Report, the Report still demonstrates that OSHA can do a better job of assessing costs, benefits and available alternatives than it did in the Cotton Dust proceeding.

[95] The usefulness of cost and benefit assessments in regulatory decisionmaking is discussed in an extensive literature. *See, e.g.*, National Academy of Sciences, *Decision Making for Regulating Chemicals in the Environment* 44-45 (1975); Kasper, *Cost-Benefit Analysis in Environmental Decisionmaking*, 45 Geo. Wash. L. Rev. 1013 (1977); Oi, *On the Economics of Industrial Safety*, 38 L. & Contemp. Prob. 669 (1974).

2. *The Judgment Below Must Be Reversed Because OSHA Did Not Show That the Standard Would Produce a Reduction in Risk That Is Significant in Light of Its Costs.*

Under the approach followed by OSHA and the court below, it was irrelevant that the Cotton Dust Standard might yield health protection benefits not significantly greater than those that could be realized from a much less costly standard. Consequently, OSHA did not assess the relative risk reduction benefits of its Standard and of the alternative proposed by ATMI, to see whether its more stringent (and far more costly) Standard was justified in light of the relative benefits and respective costs. For that reason, the judgment below must be reversed.

If the court below had imposed such a requirement, however, it could not reasonably have found that OSHA satisfied it here, since the agency never correctly identified the costs or the benefits of its Standard, let alone of the ATMI alternative. The critical flaws in OSHA's cost estimate already have been described at some length, *see* pages 24-30 *supra*, and need not be revisited. It will be useful, however, to comment briefly on the inadequacy (indeed, the virtual nonexistence) of OSHA's assessment of risk reduction benefits.

OSHA devoted only one page of the Standard's 45-page preamble to a discussion of benefits. 43 Fed. Reg. at 27378-79. That discussion reveals almost nothing about the risk reduction benefits that OSHA's Standard might be expected to produce in comparison to the ATMI alternative.[96]

---

[96] In any event, it is analytically flawed. For example, OSHA arbitrarily raised the number of employees in yarn manufacturing by almost 60% from 126,000 to 200,000. No support was offered for this capricious rejection of figures taken directly from a United States Department of Labor survey. Ex. 6, No. 76 at III-1, 3, 23. Moreover, OSHA applied Merchant's predicted prevalence rate to

First, OSHA made no attempt to analyze the impact that a medical surveillance program (combined with selective respirator use and employee transfer in appropriate cases) would have on the development of byssinosis at any level of exposure. Yet OSHA acknowledged that a program of medical screening (combined with such administrative measures) is likely to have a significant impact in reducing the incidence of byssinosis among textile workers.[97] And the President's Council on Wage and Price Stability suggested that the benefits of a medical surveillance or respirator program might well be greater than the benefits that would be achieved by reducing permissible exposure levels through engineering dust controls.[98]

Second, OSHA made no attempt to differentiate between the various grades or symptoms of byssinosis in evaluating the potential benefits of its Standard. Since the court below did not decide that the nondisabling and reversible symptoms of byssinosis constitute "material impairment of health," Pet. App. at 52-53, 617 F.2d at 655, any reduction in the risk of developing this mild form of byssinosis should not be included as a potential health benefit within the meaning of the OSH Act. As noted by the Council on Wage and Price Stability, "if

---

the entire yarn manufacturing industry, even though Merchant had acknowledged that his study cannot be used to draw inferences for the entire textile industry. *See* note 19 *supra*.

[97] *See* page 15 *supra*; 43 Fed. Reg. at 27359, col. 3; Cotton Dust Report to Congress 31, 49.

[98] Comments of the Council on Wage and Price Stability, Ex. 111 at 29. As the Council pointed out, medical screening combined with respirator use and employee transfer where appropriate "might provide more cost-effective solutions to the byssinosis problem." *Id.* at 30. For that reason, it urged OSHA to examine the "cost effectiveness of each provision [*i.e.*, dust control, medical surveillance, respirator use and employee transfer] . . . independently and in concert with the other provisions in order to ensure the most protection for the least cost." *Id.*

eliminating 'material impairment' and not occupational discomfort is OSHA's main concern, then standard development should focus on the irreversible harmful health effects." [99]

Even if prevention of the mild, low-grade symptoms of byssinosis were a cognizable health benefit under the Act, however, it surely is a much less significant benefit than the prevention of chronic and disabling byssinosis. As the Council on Wage and Price Stability observed, any meaningful assessment of benefits must reflect these differences in the health impact of the different grades of byssinosis, for "a system that simply sums all degrees of health problems from the serious to the inconsequential omits important information and may be misleading." [100] Yet OSHA's offhand discussion of benefits treats all forms of byssinosis the same.

Thus, OSHA's discussion of benefits in the Cotton Dust proceeding is at best a formality that does not begin to approach the kind of careful and systematic assessment that would permit the agency to determine whether the Standard is likely to result in a significant reduction in risk as compared to ATMI's much less costly alternative.[101] Instead, OSHA treated cotton dust like a carcinogen, ignoring the fact that byssinosis, in its early

---

[99] Comments of the Council on Wage and Price Stability, Ex. 111 at 15.

[100] *Id.* at 15, 27, 29. *Cf. National Congress of Hispanic Am. Citizens v. Marshall*, 626 F.2d 882, 889 (D.C. Cir. 1979) (approving the decision of OSHA to consider "the nature and severity of the hazardous exposure" as well as the number of employees to be benefited in setting priorities for the promulgation of occupational health and safety standards).

[101] *Cf. United Parcel Serv. of Ohio, Inc. v. OSHRC*, 570 F.2d 806, 812 (8th Cir. 1978) (overturning an order enforcing a safety standard because of the failure "to give consideration to less rigorous requirements" having less severe economic consequences).

stages is nondisabling and reversible and that a program of medical surveillance is likely to have a dramatic impact in reducing the number of serious cases of byssinosis that might otherwise occur.[102] As a result, the record in this case contains no supportable determination that the reduction in risk that might result from the Cotton Dust Standard is significant when considered in light of the costs. For that reason, the judgment of the court below must be reversed.[103]

II. THE COURT BELOW ERRONEOUSLY CONCLUDED THAT OSHA HAS AUTHORITY TO REQUIRE EMPLOYERS TO MAINTAIN THE WAGES AND BENEFITS OF EMPLOYEES WHO ARE TRANSFERRED FOR REASONS UNRELATED TO HEALTH IMPAIRMENT.

Under the Standard, respirators must be provided and used in various circumstances—for example, during the period in which engineering controls are being installed or where such controls are not sufficient to reduce ex-

---

[102] 43 Fed. Reg. at 27358-59; Comments of the Council on Wage and Price Stability, Ex. 111 at 6-7, 13, 15, 27, 29.

[103] In fact, OSHA did not even establish that textile workers would be exposed to a "significant risk of material health impairment" if the ATMI alternative were adopted. For that reason alone, the Cotton Dust Standard should be set aside, as the Benzene Standard was in similar circumstances.

The judgment below also should be reversed because, although ATMI "opposed on substantial grounds" the strict numerical limits adopted by OSHA and proposed a much less costly alternative, OSHA made no serious attempt to "explain and support" its rejection of the ATMI alternative in favor of the much more burdensome approach of the Standard. *Associated Indus. of New York State, Inc. v. Department of Labor*, 487 F.2d 342 (2d Cir. 1973); *cf. Synthetic Organic Chem. Mfrs. Ass'n v. Brennan*, 503 F.2d 1155, 1160 (3d Cir. 1974), *cert. denied*, 420 U.S. 973 (1975) (OSHA must consider presently available alternatives); *Industrial Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d at 475 (OSHA must explain why it "chooses to follow one course rather than another").

posures below the applicable PEL.[104] Respirators also must be provided for use during various maintenance, repair and cleaning activities, or whenever an employee requests a respirator, whether or not the PEL is exceeded.

Pursuant to subsection (f) (2) (v) of the Standard, if a physician determines that an employee is unable to wear a respirator when the Standard requires its use, the employee must be given the opportunity to transfer to another position, having a dust level at or below the PEL, that is available or later becomes available.[105] Such transfers are to be made even though the employee shows no symptom of byssinosis and even though his inability to wear a respirator is not attributable to past employment. Moreover, employers must insure that an employee who is so transferred "suffers no loss of earnings or other employment rights or benefits as a result of the transfer." [106] This guarantee against any loss of earnings, rights or benefits appears to be subject to no limitation in terms of duration or otherwise.

The wage guarantee provision of the Cotton Dust Standard raises a relatively narrow question for review in this case: Whether OSHA has authority to require employers to maintain the earnings, benefits, and rights of employees who are transferred without any demonstration that they are suffering a work-related health impairment or even that their inability to wear respirators is related to exposure to cotton dust or other aspects of their employment.[107]

---

[104] 29 C.F.R. § 1910.1043(f) (1979), Pet. App. at 6-9.

[105] 29 C.F.R. § 1910.1043(f)(2)(v) (1979), Pet. App. at 8-9.

[106] *Id.*

[107] On the facts of the present case, there is no need to address the separate question whether OSHA can impose a medical removal-wage retention requirement that is more specifically related to health impairment. This latter question is raised by OSHA's Lead

No one has suggested that the OSH Act contains an express grant of authority for the imposition of a wage guarantee provision,[108] and the court below did not pretend otherwise. The court did conclude, however, that the provision was impliedly authorized by Section 3(8) of the Act. *See* Pet. App. at 96, 617 F.2d at 674. The court reasoned that, in the absence of a wage guarantee provision, employees might "refrain from disclosing actual health impairments from the dust exposure," because they might be reluctant to risk "disadvantageous transfers, or even risk losing their jobs." Pet. App. at 97, 617 F. 2d at 674-75.

The court apparently misconceived the nature of the employee transfer-wage guarantee provision of the Cotton Dust Standard. Under the Standard, employee transfers are not made when the worker is found to have suffered "actual health impairments from the dust exposure." To the contrary, the fact that an employee has suffered actual health impairment from dust exposure does not entitle him to a transfer and wage guarantee.[109] A transfer is required only when an employee is found to be unable to wear a respirator, whether or not he exhibits any symptoms of even the mildest form of bys-

---

Standard, 29 C.F.R. § 1910.1025(d), (j), (k) (1979), *as amended at* 44 Fed. Reg. 50338 (1979), *id.* at 60981, *id.* at 68828, which was at issue in *United Steelworkers of America, AFL-CIO-CLC v. Marshall*, [1980] OSH Dec. (CCH) 30329, 8 OSH Cas. (BNA) 1810 (D.C. Cir. Aug. 15, 1980). As OSHA recognized, the broader questions of mandatory medical removal and wage retention posed in the Lead Standard proceeding are not presented by the Cotton Dust Standard, 43 Fed. Reg. at 27387, col. 3, and the court below did not address those questions. *See* Pet. App. at 95-96 n.238, 617 F.2d at 674 n.238. Consequently, a decision regarding the wage guarantee provision of the Cotton Dust Standard would not necessarily be applicable to the substantially different medical removal-rate retention provision of the Lead Standard.

[108] *See* 43 Fed. Reg. at 52976.

[109] The fact that health impairment does not entitle a worker to the wage guarantee is consistent with OSHA's description of the

sinosis.[110] Thus, the court below appears to have upheld the validity of the Cotton Dust wage guarantee provision under a health impairment rationale that does not apply to the Standard.

In any event, reading Section 3(8) as an authorization for OSHA to impose the wage guarantee provision under the rationale advanced by the court below proves too much, for it would invest OSHA with virtually limitless authority to impose almost any imaginable requirement that is arguably related to promoting worker health. For example, employer-provided universal health insurance would presumably promote worker health, as would employer-sponsored food-stamp programs or retreats to health spas. Surely Congress did not intend to authorize OSHA to include such measures in its health standards; yet, it is difficult to distinguish them from a wage guarantee provision under the statutory authorization test laid down by the court.[111]

In short, the statutory construction espoused by the court below would permit an "uncanalized delegation of legislative power." *Benzene*, 48 U.S.L.W. at 5040 (Rehnquist, J., concurring). As the *Benzene* plurality observed, "[a] construction of the statute that avoids this kind of open-ended grant should certainly be favored." *Id.* at 5032 (plurality opinion). And here, as in that case, serious constitutional questions can be avoided by resort

---

provision as aiming "to minimize any adverse *economic impact* on the employee by virtue of the inability to wear a respirator." 43 Fed. Reg. at 27387, col. 3 (emphasis added). Thus, the provision—which mandates a wage guarantee even without health impairment but does not assure such a guarantee where there is actual health impairment—cannot fairly be characterized as medically related.

[110] 29 C.F.R. § 1910.1043(f)(2)(v) (1979), Pet. App. at 8-9.

[111] *See also Taylor Diving & Salvage Co. v. Department of Labor*, 599 F.2d 622, 625 (5th Cir. 1979) (holding that Section 3(8) of the Act does not authorize OSHA to protect an employee's job security by limiting the medical fitness standards that an employer may impose as a qualification for continuing employment).

to legislative history that plainly limits the reach of what otherwise might be overbroad statutory language.

In the course of the debates on the OSH Act, the House of Representatives considered and rejected a provision that would have permitted a form of wage guarantee. Specifically, as this Court noted in *Whirlpool Corp. v. Marshall*, 445 U.S. 1 (1980), the Daniels bill as originally introduced permitted an employee to absent himself from the workplace at his own initiative if potentially toxic or harmful substances were present "without loss of regular compensation for such period." [112] The Senate bill contained no comparable "strike with pay" provision; nor did the bill as enacted. After canvassing this legislative history in *Whirlpool Corp. v. Marshall*, this Court observed that

> What primarily troubled Congress about the Daniels bill's "strike with pay" provision was *its requirement that employees be paid their regular salary after* . . . refus[ing] to work . . . . It is instructive that virtually every time the issue of an employee's right to absent himself from hazardous work was discussed in the legislative debates, *it was in the context of the employee's right to continue to receive his usual compensation.*

445 U.S. at 17-18 (emphasis added).[113] This same guaranteed right to receive pay irrespective of work performed is an integral feature of the wage guarantee scheme established in the Cotton Dust Standard. The rejection of the "strike with pay" provision of the Daniels bill makes clear that Congress did not intend to empower OSHA to impose such a requirement.[113]

---

[112] H.R. 16785, 91st Cong., 2d Sess. § 19(a)(5) (1970), *reprinted in* Leg. Hist. at 969-70.

[113] Although the Court upheld the regulation at issue in *Whirlpool* (authorizing a worker to absent himself in good faith from a "hazardous condition" in the workplace), it stressed that the regulation in question did not "require employers to pay workers who refuse to perform their assigned tasks in the face of imminent danger." 445 U.S. at 19.

Furthermore, Congress passed the OSH Act barely a year after enacting the Federal Coal Mine Health and Safety Act of 1969. 30 U.S.C. §§ 801-960 (1976). The Coal Act contains language authorizing the responsible agency in general terms to act to promote the health and safety of miners. *See* 30 U.S.C. § 811(d). Yet Congress in the Coal Act also expressly created a right of guaranteed wage protection for miners transferred to less hazardous work because of pneumoconiosis.[114] Congress was thus fully aware of the possible importance of wage guarantees in promoting worker health and safety when it debated the Occupational Safety and Health Act the following year. Yet it chose not to include in the OSH Act the type of earnings protection requirement that only a year before it expressly had included in the Coal Act.[115] Against this legislative background, OSHA's attempt to imply such authority under the OSH Act must be rejected.[116]

---

[114] In order to make sure that mine workers participated in the X-ray program made available to them, the Coal Act specifically provided that any miner who showed evidence of pneumoconiosis "shall be afforded the option of transferring" to other areas of the mine and "shall receive compensation for such work at not less than the regular rate of pay received by him immediately prior to his transfer." 30 U.S.C. § 843(b)(2), (3) (1976).

Even with respect to pneumoconiosis, neither the Coal Act of 1969 nor the Federal Mine Safety and Health Act of 1977 protects a transferred miner's seniority rights. *See, e.g.*, Section 201(a)(7), 30 U.S.C. § 811(a)(7) (Supp. III 1979). By contrast, the wage guarantee procedure under the Cotton Dust Standard purports to protect all worker "rights" and "benefits," presumably including seniority rights.

[115] Congress also included a wage guarantee provision in the Clean Air Act Amendments of 1977. *See* 42 U.S.C. § 7410(a)(6) (Supp. III 1979).

[116] *Cf. General Elec. Co. v. Southern Constr. Co.*, 383 F.2d 135, 138 n.4 (5th Cir. 1967), *cert. denied*, 390 U.S. 955 (1968).

CONCLUSION

For the reasons set forth above, the judgment of the court of appeals should be reversed and the case remanded with instructions to grant the petitions for review and vacate the Standard.

Respectfully submitted,

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART AND EDWARDS
First National Bank Tower
Two Peachtree Street, N.W.
Atlanta, Georgia 30383

NEIL J. KING
Counsel of Record
A. STEPHEN HUT, JR.
ANDREW N. VOLLMER
WILMER & PICKERING
1666 K Street, N.W.
Washington, D.C. 20006
(202) 872-6000

Counsel for American Textile Manufacturers Institute, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Milliken and Company

JOSEPH K. MADDOX, JR.
P.O. Box 5784
Spartanburg, S.C. 29304

Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Hermitage, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Arkwright Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Blair Mills, Inc.

HARLAN H. HUNTLEY
ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541

Counsel for Dan River, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
BAKER & HOSTETLER
818 Connecticut Ave., N.W.
Washington, D.C. 20006

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
Greensboro, N.C. 27405

Counsel for Cone Mills Corporation

DAN M. BYRD, JR.
J. SPRATT WHITE
P.O. Box 70
Fort Mill, S.C. 29715

Counsel for Springs Mills, Inc.

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

Counsel for Fieldcrest Mills, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Mayfair Mills

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
CONSTANGY, BROOKS & SMITH
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P.O. Box 71
West Point, Georgia 31833

Counsel for West Point-Pepperell, Inc.

November 20, 1980

APPENDIX

Article I, Section 1 of the United States Constitution provides in pertinent part:

> All legislative Powers herein granted shall be vested in a Congress of the United States . . . .

Section 2(b) of the OSH Act and paragraph (9) of that section, 29 U.S.C. § 651(b)(9) (1976), provide:

> The Congress declares it to be its purpose and policy, through the exercise of its powers to regulate commerce among the several States and with foreign nations and to provide for the general welfare, to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources—
>
> . . . .
>
> (9) by providing for the development and promulgation of occupational safety and health standards . . . .

Section 3(8) of the OSH Act, 29 U.S.C. § 652(8) (1976), provides:

> For the purposes of this chapter—
>
> (8) The term "occupational safety and health standard" means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

Section 6 of the OSH Act, 29 U.S.C. § 655 (1976), contains the following pertinent provisions:

(a) Promulgation by Secretary of national consensus standards and established Federal standards; time for promulgation; conflicting standards

Without regard to chapter 5 of title 5 or to the other subsections of this section, the Secretary shall, as soon as practicable during the period beginning with the effective date of this chapter and ending two years after such date, by rule promulgate as an occupational safety or health standard any national consensus standard, and any established Federal standard, unless he determines that the promulgation of such a standard would not result in improved safety or health for specifically designated employees. In the event of conflict among any such standards, the Secretary shall promulgate the standard which assures the greatest protection of the safety or health of the affected employees.

(b) Procedure for promulgation, modification, or revocation of standards

The Secretary may by rule promulgate, modify, or revoke any occupational safety or health standard in the following manner:

. . . .

(5) The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree

of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired.

. . . .

(f) Judicial review

Any person who may be adversely affected by a standard issued under this section may at any time prior to the sixtieth day after such standard is promulgated file a petition challenging the validity of such standard with the United States court of appeals for the circuit wherein such person resides or has his principal place of business, for a judicial review of such standard. A copy of the petition shall be forthwith transmitted by the clerk of the court to the Secretary. The filing of such petition shall not, unless otherwise ordered by the court, operate as a stay of the standard. The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

Nos. 79-1429 and 79-1583

JAN 14 1981

In the Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENT

WADE H. MCCREE, JR.
Solicitor General

KENNETH S. GELLER
Deputy Solicitor General

BARRY SULLIVAN
Assistant to the Solicitor General

Department of Justice
Washington, D.C. 20530
(202) 633-2217

CARIN A. CLAUSS
Solicitor of Labor

BENJAMIN W. MINTZ
Associate Solicitor

ALLEN H. FELDMAN
DENNIS K. KADE
DIANE E. BURKLEY
JOHN A. BRYSON
Attorneys

Department of Labor
Washington, D.C. 20210

In the Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.

No. 79-1583

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, ET AL.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENT

QUESTIONS PRESENTED

1. Whether the occupational health standard for cotton dust, which is based on the conclusion of the Secretary of Labor that technology exists to meet the standard and that the costs of compliance are well within the capability of the textile industry, is "feasible" within

the meaning of Section 6(b)(5) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 655(b)(5).

2. Whether Section 3(8) of the Act, 29 U.S.C. 652(8), which provides that a health standard must be "reasonably necessary or appropriate to provide safe or healthful employment and places of employment," requires the Secretary to conduct a cost-benefit analysis and determine that the costs of a particular standard are "justified" by the expected benefits.

3. Whether the transfer and income protection provision of the cotton dust standard is a measure that is "reasonably necessary or appropriate to provide safe or healthful employment" within the meaning of Section 3(8) of the Act, 29 U.S.C. 652(8).

TABLE OF CONTENTS

	Page
Opinions below	1
Jurisdiction	1
Statement	1
A. Introduction	1
B. Toxic effects of cotton dust	4
C. The basis for the final standard	8
1. The Secretary's health determinations and dust control strategy	9
2. The feasibility of the standard	12
a. Technological feasibility	13
b. Economic feasibility	14
3. The medical transfer and income protection provision	23
D. The decision of the court of appeals	24
Summary of argument	27
Argument:	
I. The cotton dust standard is reasonably necessary and appropriate because it protects against a significant risk of material health impairment	29
II. The Secretary's response to the significant health threat posed by cotton dust is economically justified and required by the statute	37
A. A cost-benefit test is inconsistent with the language and legislative history of Section 6(b)(5)	39
B. The requirement of Section 3(8) that a standard be "reasonably necessary or appropriate" does not embody a cost-benefit test	52

Argument—Continued Page

C. A cost-benefit test is not necessary to prevent serious economic disruptions or serious misallocation of scarce resources for combating occupational disease 55

III. The Secretary correctly concluded that the cotton dust standard is economically feasible 63

IV. The medical transfer and income protection provision is within the Secretary's authority to impose requirements reasonably necessary and appropriate to secure healthful employment 65

Conclusion 70

TABLE OF AUTHORITIES

CITATIONS

Cases:

AFL-CIO v. *Brennan*, 530 F.2d 109 ..... 39, 51
A.L.A. Schechter Poultry Corp. v. *United States*, 295 U.S. 495 62
American Frozen Food Institute v. *Train*, 539 F.2d 107 51
American Iron & Steel Institute v. *EPA*, 426 F.2d 1027 51
American Iron & Steel Institute v. *OSHA*, 577 F.2d 825, cert. dismissed, No. 78-918 (Sept. 10, 1980) 39, 51
American Petroleum Institute v. *OSHA*, 581 F.2d 493, aff'd on other grounds, *Industrial Union Department* v. *American Petroleum Institute*, No. 78-911 (July 2, 1980) 50
American Smelting & Refining Co. v. *OSHRC*, 501 F.2d 504 34
C.P.C. Int'l, Inc. v. *Train*, 540 F.2d 1329 51
Clark v. *Uebersee Finanz-Korp*, 332 U.S. 480 53
Cotton Warehouse Ass'n v. *Marshall*, No. 79-1789 (Oct. 6, 1980) 27
EPA v. *National Crushed Stone Ass'n*, No. 79-770 (Dec. 2, 1980) 37, 40, 44, 51
FPC v. *Hope Natural Gas Co.*, 320 U.S. 591 49

Cases—Continued

Page

FTC v. *Simplicity Pattern Co.*, 360 U.S. 55 47
Florida Peach Growers Ass'n v. *Dep't of Labor*, 489 F.2d 120 46
Golden State Bottling Co. v. *NLRB*, 414 U.S. 168.. 64
Great Atlantic & Pacific Tea Co. v. *FTC*, 440 U.S. 69 47
H & H Tire Co. v. *Department of Transportation*, 471 F.2d 350 54-55
Harris v. *McRae*, No. 79-1268 (June 30, 1980)..... 38
Industrial Union Department v. *American Petroleum Institute* (*Benzene*), No. 78-911 (July 2, 1980) 27, 29, 30, 31, 34, 37, 38, 40, 45, 50, 53, 54, 56, 61, 63
Industrial Union Department v. *Hodgson*, 499 F.2d 467 .....39, 49, 50, 63
Marshall v. *Sun Petroleum Products Co.*, 622 F.2d 1176, cert. denied, No. 80-471 (Dec. 15, 1980).... 52
National Realty and Construction Co. v. *OSHRC*, 489 F.2d 1257 47
Opp Cotton Mills, Inc. v. *Administrator*, 312 U.S. 126 63
Panama Refining Co. v. *Ryan*, 293 U.S. 388 62
R.M.I. Co. v. *Secretary of Labor*, 594 F.2d 566..... 51
Samson Paper Bag Co., 3 Empl. Safety & Health Guide (CCH) ¶ 24,555 (June 16, 1980) 52
Society of Plastics Industry, Inc. v. *OSHA*, 509 F.2d 1301, cert. denied, 421 U.S. 992 51
TVA v. *Hill*, 437 U.S. 153 37
Texas Independent Ginners Ass'n v. *Marshall*, 630 F.2d 398 50
TransAmerica Mortgage Advisors, Inc. v. *Lewis*, 444 U.S. 11 47
Turner Co., Div. of Olin Corp. v. *Secretary of Labor*, 561 F.2d 82 51-52
United States v. *Dickson*, 40 U.S. (15 Pet.) 141.... 58
United Steelworkers of America v. *Marshall*, No. 79-1048 (D.C. Cir. Aug. 15, 1980) 49, 58, 68, 69
Universal Camera Corp. v. *NLRB*, 340 U.S. 474.... 64
Weinberger v. *Hynson, Westcott & Dunning*, 412 U.S. 609 53
Whirlpool Corp. v. *Marshall*, 445 U.S. 1 ..38, 67, 68-69, 70

Statutes and regulations: Page

Clean Air Act Amendments of 1977, 42 U.S.C. (Supp. III) 7401 *et seq.*:

Section 110(a)(6), 42 U.S.C. (Supp. III) 7410(a)(6) 69
Section 112(b)(1)(B), 42 U.S.C. (Supp. III) 7412(b)(1)(B) 55
Section 211(c)(2)(A) and (B), 42 U.S.C. (Supp. III) 7545(c)(2)(A) and (B) 40

Consumer Product Safety Act, Section 9(c)(1)(C) and (2)(A), 15 U.S.C. 2058(c)(1)(C) and (2)(A) 54

Energy Policy and Conservation Act of 1975, 42 U.S.C. (and Supp. III) 6201 *et seq.*:

Section 325(a), 42 U.S.C. 6295(a) 40
Section 325(a), 42 U.S.C. (Supp. III) 6295(a) 40

Federal Coal Mine and Health Safety Act of 1969, 30 U.S.C. 843(b)(2), (3) 69

Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1251 *et seq.*:

33 U.S.C. 1311(b)(1)(A) 40
33 U.S.C. 1311(b)(2)(A) 51
33 U.S.C. 1314(b)(1)(B) 40

National Traffic and Motor Vehicle Safety Act, 15 U.S.C. 1381 *et seq.* 54

15 U.S.C. 1392(f)(3) 55

Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.*:

Section 2, 29 U.S.C. 651 ..... 46, 68
Section 2(b), 29 U.S.C. 651(b) 2
Section 2(b)(5), 29 U.S.C. 651(b)(5) 68
Section 3(8), 29 U.S.C. 652(8) 29, 50, 53, 66, 68
Section 5(a)(1), 29 U.S.C. 654(a)(1) 46
Section 6(a), 29 U.S.C. 655(a) 2, 47, 52
Section 6(b), 29 U.S.C. 655(b) 4, 52
Section 6(b)(5), 29 U.S.C. 655(b)(5) 22, 26, 27, 31, 34, 39, 47, 48, 50, 53, 55, 58, 68

Statutes and regulations—Continued

	Page
Section 6(b)(6)(A)-(B), 29 U.S.C. 655(b)(6)(A)-(B)	44, 47
Section 6(d), 29 U.S.C. 655(d)	44, 57
Section 6(f), 29 U.S.C. 655(f)	4, 24, 46, 47
Section 6(g), 29 U.S.C. 655(g)	56
Section 10, 29 U.S.C. 659	52
Walsh-Healey Act, 41 U.S.C. 35 *et seq.*	2
41 U.S.C. 35(e)	52
29 C.F.R. 1910.1000(e)	3
29 C.F.R. 1910.1043(f)(2)(v)	24, 66
Miscellaneous:	
115 Cong. Rec. (1969):	
p. 22511	48
pp. 22511, 22517	48
p. 22512	48
Doniger, *Federal Regulation of Vinyl Chloride: A Short Course in the Law and Policy of Toxic Substances Control*, Ecol. L. Q. 497 (1978)	62
Exec. Order No. 12044, 43 Fed. Reg. 12661, 12663 (1978)	59
34 Fed. Reg. 7946, 7953 (1969)	2
41 Fed. Reg. (1976):	
p. 46751	60
p. 56498	14
pp. 56500-56501	5
p. 56504	3, 30
pp. 56504-56508	9
p. 56505	32
43 Fed. Reg. (1978):	
pp. 5937, 5944-5945, 5948	57
pp. 27350, 27370	20
p. 27351	3
p. 27352	7
pp. 27352-27353	4

Miscellaneous—Continued Page

pp. 27352-27354 8
pp. 27352-27355 2
p. 27353 ..... 4, 7, 31, 32
p. 27354 ..... 6, 7, 8, 11, 31, 32
pp. 27354-27355 2
p. 27355 ..... 3, 30
pp. 27355-27360 9
pp. 27356, 27358 10
pp. 27356-27359 33
p. 27357 ..... 10, 30
pp. 27357-27358 30
p. 27358 ..... 10, 30
p. 27359 ..... 8, 10, 11, 36
p. 27360 ..... 3, 12
pp. 27362-27363 13
pp. 27362-27364 18
p. 27363 3
p. 27364 3
pp. 27365, 27379 2
pp. 27366-27367 ..... 14, 16, 18, 65
p. 27367 16
p. 27371 18
p. 27372 18
p. 27373 ..... 17, 19, 64
p. 27377 19
p. 27378 ..... 22, 23
pp. 27378-27379 22
p. 27384 ..... 12, 36
pp. 27386-27387 28
p. 27387 ..... 23, 66, 67, 68
p. 27389 ..... 23, 65
pp. 52983-52984, 53008 57
p. 52990 56
pp. 54354, 54494 57
pp. 54474-54476 50

44 Fed. Reg. 58642, 58661 (1979) 55
44 Fed. Reg. 58660-58661 (1979) 55
45 Fed. Reg. (1980):

p. 5248 60
p. 5249 61

Miscellaneous—Continued

	Page
pp. 5284-5285	56
pp. 50328-50329	27
H.R. Rep. No. 92-1153, 92d Cong., 2d Sess. (1972)	54
H.R. Conf. Rep. No. 94-700, 94th Cong., 1st Sess. (1975)	40
Industrial Hygiene Field Operations Manual, U.S. Department of Labor, Occupational Safety and Health Administration (1980)	57-58
Note, *Cost-Benefit Analysis for Standards Regulating Toxic Substances Under the Occupational Safety and Health Act: American Petroleum Institute* v. *OSHA*, 60 B.U.L. Rev. 115 (1980)	61
S. 2788, 91st Cong., 1st Sess. (1969)	48
S. Rep. No. 1301, 89th Cong., 2d Sess. (1966)	55
S. Rep. No. 92-749, 92d Cong., 2d Sess. (1972)	54
S. Rep. No. 93-132, 93d Cong., 1st Sess. (1973)	44
S. Conf. Rep. No. 94-516, 94th Cong., 1st Sess. (1975)	40
Senate Comm. on Governmental Affairs, 95th Cong., 2d Sess., Study on Federal Regulation, Vol. VI (Comm. Print 1978)	60
Subcomm. on Labor of the Senate Comm. on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971)	1
Webster's Third New International Dictionary (1976)	39

OPINIONS BELOW

The opinion of the court of appeals (Pet. App. 19-102)[1] is reported at 617 F.2d 636. The Secretary's standard for occupational exposure to cotton dust, and the statement of reasons supporting the standard, are published at 43 Fed. Reg. 27350-27399 (1978), as amended at 43 Fed. Reg. 28473-28474, 35032-35035, and 56893-56894 (1978).

JURISDICTION

The judgment of the court of appeals was entered on October 24, 1979 (Pet. App. 26), and petitions for rehearing were denied on January 11, 1980 (Pet. App. 103-105). The petition for a writ of certiorari in No. 79-1429 was filed on March 14, 1980, and the petition for a writ of certiorari in No. 79-1583 was filed on April 9, 1980. On October 6, 1980, the Court granted the petition in No. 79-1583 in full and granted the petition in No. 79-1429 limited to questions 1, 2 and 4 (J.A. 489). The jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT

A. Introduction

Byssinosis, which is commonly known as "brown lung" disease, is a painful and permanently disabling respiratory disease that is induced by the inhalation of cotton

---

[1] "Pet. App." refers to the appendix to the petition in No. 79-1429. "J.A." refers to the joint appendix filed in this Court. "App." refers to the joint appendix filed in the court of appeals. "Leg. Hist." refers to the Subcomm. on Labor of the Senate Comm. on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971). For convenience, we shall refer to the Secretary, the Assistant Secretary, and the Occupational Safety and Health Administration as "the Secretary" or "the agency."

dust.[2] Most victims of byssinosis are textile workers,[3] among whom the disease has been known to be widespread since at least the beginning of the eighteenth century (Pet. App. 29 & n.11). The prevalence of this disease, which Congress found to exemplify the "magnitude of [our occupational health] problem" (Leg. Hist. 143), played a central role in the decision to enact the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.*, which aims "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources" (Section 2(b) of the Act, 29 U.S.C. 651(b)).

On May 29, 1971, the Secretary, as authorized by Section 6(a) of the Act, 29 U.S.C. 655(a), adopted a preexisting federal standard as the occupational health standard for cotton dust.[4] The 1971 standard identified

---

[2] Numerous investigators have established the relationship between cotton dust and the disease. See J.A. 15-22; Pet. App. 108-124; App. 210-217, 218-228. Despite extensive research, however, medical science has not yet identified the particular component of cotton dust that causes byssinosis. 43 Fed. Reg. 27352-27355 (1978). Medical science thus broadly defines "cotton dust" to include all dust in the working environment of employees who work with cotton, without regard to whether the origin of the dust can be traced directly to the cotton plant, and the Secretary has adopted that definition for regulatory purposes. 43 Fed. Reg. 27354-27355 (1978).

[3] The textile industry is divided into two basic operational segments: (1) yarn manufacturing, and (2) weaving of yarn into cloth. Between 126,000 and 200,000 workers are exposed to cotton dust each day in yarn manufacturing operations consisting of opening, picking, carding, drawing, roving, spinning, winding, spooling, twisting, and warping. See 43 Fed. Reg. 27365, 27379 (1978). Many additional workers are exposed in the weaving process (App. 517).

[4] Under Section 6(a) of the Act, 29 U.S.C. 655(a), the Secretary was authorized during an initial two-year period to adopt any existing federal health and safety standard or any national "consensus" standard. In 1969, the Secretary had set an airborne dust concentration limit as an occupational health requirement for public contractors under the Walsh-Healey Act, 41 U.S.C. 35(e) (34 Fed. Reg. 7946, 7953 (1969)). That limitation incorporated the recom-

a maximum permissible exposure level (PEL) for airborne concentrations of cotton dust and required that employers meet that level through the use of feasible engineering controls, with respirators to be used only where the PEL could not be achieved by engineering controls. 29 C.F.R. 1910.1000(e).[5]

On June 19, 1978, after extensive informal rulemaking proceedings, the Secretary promulgated a more stringent health standard under Section 6(b) of the Act, 29

---

mendation of the American Conference of Governmental Industrial Hygienists (ACGIH) that exposure be limited to 1,000 micrograms of total dust per cubic meter of air (1000 ug/m^3) averaged over an eight-hour workday. "Total dust" includes both respirable and nonrespirable dust fractions. In 1978, when the Secretary set the present standard, he followed the weight of current scientific opinion by keying the maximum exposure level to the respirable dust fraction (43 Fed. Reg. 27355 (1978)). ACGIH had likewise adopted that measuring device in 1974, when it issued a revised recommendation that exposure should be limited to 200 ug/m^3, the standard that the Secretary eventually adopted here for all operations except slashing and weaving. See 43 Fed. Reg. 27351 (1978).

In all operations except slashing and weaving, the 1971 standard —1000 ug/m^3 of total dust—is roughly equivalent to 500 ug/m^3 of respirable dust, as measured by the 1978 standard. See J.A. 464-465; App. 384; 43 Fed. Reg. 27355 (1978). Slashing and weaving are exceptional because a substantial portion of the respirable dust comes from starch that is used in those operations and is not harmful. The Secretary set a higher permissible exposure level—750 ug/m^3—in those operations. 43 Fed. Reg. 27360 (1978). See page 12, *infra*. See also 41 Fed. Reg. 56504 (1976).

[5] "Engineering controls," for purposes of the cotton dust standard, are mainly general and local ventilation systems designed to remove particulate matter from the air by using suction to capture emission source dust, which is then conveyed to a filtration system that screens out the particulates before recirculating the air into the working area. General ventilation systems consist of filtration systems used in conjunction with central air conditioning equipment (43 Fed. Reg. 27363 (1978)). Local exhaust ventilation requires enclosure of machinery and the use of suction hoods that are placed as close as possible to the emission source; the air is then filtered and recirculated (*id.* at 27364). See J.A. 79-82.

U.S.C. 655(b).[6] The new standard sets stricter PELs governing airborne concentrations of cotton dust in various manufacturing processes and requires a program of prophylactic work practices, education, training, and medical surveillance. The standard allows employers four years within which to meet the PELs through engineering controls and requires the use of respirators in the interim. Respirators will thereafter be required where the PEL cannot feasibly be reached through engineering controls. The standard also provides that whenever a physician determines that an employee is unable to wear a respirator, the employee must be given the opportunity to transfer to another position having a dust level at or below the PEL, if one is available, without loss of pay.

Petitioners, among others, sought judicial review of the standard under Section 6(f) of the Act, 29 U.S.C. 655(f). On October 24, 1979, the court of appeals upheld the standard as applied to petitioners (Pet. App. 19-102).

B. Toxic Effects of Cotton Dust

Reliable estimates show that at least 35,000 active and retired American textile workers are chronically disabled as a result of disease caused by the inhalation of cotton dust (J.A. 347; 43 Fed. Reg. 27353 (1978)).[7] In addi-

---

[6] Section 6(b) of the Act, 29 U.S.C. 655(b), establishes procedures to be followed in promulgating permanent occupational safety and health standards. Among other things, the Secretary must provide for notice and comment and the opportunity for a hearing. In the present case, comments were received from 263 parties, and 109 witnesses appeared during 14 days of hearings held in three cities. The administrative record exceeds 105,000 pages (Pet. App. 35).

[7] Such chronic disease is manifested in severe and continuous shortness of breath, chronic cough, and severe and permanent loss of lung function. The afflicted employee must often choose premature retirement despite efforts to continue working (43 Fed. Reg. 27352-27353 (1978)). Excess heart strain and death through heart failure may also result from severe breathing incapacity (J.A. 64-73).

tion, dose-response curves drawn by Dr. James Merchant, Director of the Appalachian Laboratory for Safety and Health, and his colleagues, based on studies of various textile mills, show that one quarter of yarn manufacturing workers manifest at least acute symptoms of disease at exposure levels roughly equivalent to those set by the 1971 standard.[8] The dose-response data also show that 13% of those workers will manifest such symptoms even under the 1978 PEL. See note 8, *supra*. These figures underestimate the true extent of the disease, however, because workers with severe acute symptoms will often leave their jobs rather than face further disability, and will not be counted in worker surveys (J.A. 42-49).

Detection of acute byssinosis depends largely upon worker complaints of chest tightness and breathlessness. A standard questionnaire and classification system[9] are generally used. The worker's condition is classified as grade ½ byssinosis if the symptoms occur only occasionally on the first day of the work week. If the symp-

---

[8] Dr. Merchant's dose-response curve showed that, in the yarn manufacturing processes, a 3% prevalence of all grades of byssinosis occurred at a dust level of 50 ug/m^3. At levels of 100 ug/m^3, 200 ug/m^3, and 500 ug/m^3, the percentages rose to 7%, 13%, and 26%. In the remaining processes (slashing and weaving), no significant prevalence was found at 200 ug/m^3; percentages of 5% and 15% were found at levels of 500 ug/m^3 and 1000 ug/m^3 (43 Fed. Reg. 27355 (1978); J.A. 44, 46). Dr. Merchant's figures generally accord with those of other investigators. See J.A. 56-57, 61-63; App. 376-385. Comparing his work with that of other researchers, Dr. Merchant stated that "it is remarkable once dust concentrations and different processes are taken into account, even with the different methods used, different countries, [and] slight differences in questionnaire, how similar the prevalence levels are from country to country and process to process. So I think there is a good degree of correlation between the investigations" (J.A. 437). Dr. Arend Bouhuys, Director of the Yale University Lung Research Center, made essentially the same observation (J.A. 404).

[9] The classification system was developed by Dr. Schilling in his study of the Lancashire cotton mills (41 Fed. Reg. 56500-56501 (1976)).

toms frequently occur on the first day of every work week, the condition is classified as grade 1. If the symptoms occur on the first day of every work week and regularly recur on other workdays, the condition is classified as grade 2.[10] Byssinotics classified in grades ½ through 2 are clearly unhealthy. They suffer from breathlessness and chest tightness, and they find that their normal activities must be curtailed at work and at home. One expert, who had studied byssinosis for 20 years, testified that in addition to discomfort at work, "in the evening [the worker] finds it difficult to undergo normal activities, he finds it difficult to walk rapidly home, and tends to do very little" (J.A. 434).

Not only does acute byssinosis cause substantial discomfort and interfere with normal activities, but it also causes permanent health damage. While petitioners repeatedly assert (see, *e.g.*, ATMI Br. 4-5, 49-51) that acute byssinosis is "reversible," that statement is incorrect, or at least imprecise. Symptoms may well subside if a worker is removed from the dusty environment, but the damage that has been done cannot be undone. If workers are again exposed, "[their] ability to combat the [disease] is most probably less than when they were normal to begin with" (J.A. 422-423) and repeated exposure results in a "cumulative damaging effect" (J.A. 25). Thus, even grade ½ byssinosis is a "pathological state" that carries "significant health effects." 43 Fed. Reg. 27354 (1978).[11]

---

[10] The condition is classified as grade 3 if grade 2 symptoms are accompanied by evidence of permanent incapacity, diminished pulmonary effort tolerance or reduced ventilatory capacity.

[11] As Dr. Bouhuys stated (J.A. 152-153):

> The reversible physiological changes induced by cotton dust exposure need to be prevented and should therefore be considered in establishing a standard. The reversible effects of cotton dust exposure on the lungs of workers constitute a recurrent insult to their lungs which is unacceptable if only for the fact that they are associated with symptoms of cough, chest tightness, shortness of breath, and wheezing. In addi-

Medical science has not yet discovered the precise manner in which lower grade, acute byssinosis progresses to the level of chronic, irreversible, and disabling disease (grade 3 byssinosis).[12] Indeed, the idea of an orderly progression may not accurately describe the route of the disease, as Dr. Russell Harley, an ATMI expert, testified at the hearing (J.A. 192):

> [T]he assumption is often made that the disorder progresses from ½ to 1 to 2 to 3 and, thus, all grades reflect the progress of the individual's disability. In many instances, however, there is no progression at all. Sometimes Grade 3 seems to appear *de novo* or there is a jump from 1 to 3. Among those who develop permanent disability, Grade 2 very often never occurs.

It is beyond dispute, however, that both acute and chronic stages are attributable to inhalation of cotton dust (43 Fed. Reg. 27352 (1978)) and that repeated acute insults lead to chronic impairment (43 Fed. Reg. 27354 (1978); J.A. 153-154, 411). This progression occurs because "[u]ltimately repeated bronchial construc-

---

> tion, it is likely although not definitely established that recurrent acute effects of dust exposure contribute to the insidious development of chronic lung disease. * * * [S]ince the acute effects of cotton and hemp dusts on lung function are similar, prudence indicates the assumption that temporary hypoxemia may also result from acute dust exposures to cotton dust. There can be little question that any exposure which may result in temporary disturbances of the supply of oxygen to the tissues of the human body needs to be prevented.

[12] The Secretary pointed out in the final standard that the chronic disease caused by cotton dust is not adequately described by the term "grade 3 byssinosis" (43 Fed. Reg. 27353 (1978)). For instance, some workers demonstrate excessive rates of chronic bronchitis that must be deemed attributable to their dusty environment (*ibid.*). Accordingly, the "suggestion that the term chronic obstructive pulmonary disease (COPD) [should] constitute [the] generally accepted clinical definition of chronic lung disease * * * has merit" (*ibid.*).

tion leads to fixed airway obstruction" (J.A. 411). The prevention of chronic respiratory disease thus necessarily entails the prevention of acute disease (J.A. 411; 43 Fed. Reg. 27354 (1978)).[13]

C. The basis for the final standard

On December 28, 1976, the Secretary proposed a new occupational health standard for cotton dust. The Secretary proposed, on the basis of then available health data and considerations of technological and economic feasibility, that the PEL should be set at 200 ug/m^3 for all textile operations. The PEL was to be attained ultimately through engineering controls, but respirators would be required in the interim. Because Dr. Merchant's data showed that 13% of the relevant population would remain unprotected even at this level, however, the proposed rule also mandated a medical surveillance program, specific work practices to minimize exposure, and

---

[13] The diagnostic techniques currently available for identifying acute respiratory disease caused by cotton dust are not wholly satisfactory because they depend to a large extent on the accuracy of employee responses to the standard questionnaire (see pages 5-6, *supra*), and it is not uncommon for workers to conceal their symptoms. It is therefore "possible that one could miss true grade 2 byssinotics with a medical program that is competent, is professional, well run * * *" (J.A. 439). See also 43 Fed. Reg. 27359 (1978). Acute disease, including grade ½, may sometimes be detected through objective measurements of lung function loss (pulmonary function decrement). A spirometer can be used to measure lung function loss at the beginning and end of the work day, with a decline in the volume of air expired signifying an adverse reaction to dust in the working environment. The measure most commonly used is the Forced Expiratory Volume in the first second of a deep breath expiration (FEV 1). See 43 Fed. Reg. 27352-27354 (1978). However, some true byssinotics complain of chest tightness and breathlessness but show no measurable deficit in pulmonary function, while others show pulmonary function deficit without experiencing breathlessness or chest tightness (J.A. 23, 24, 193, 435; Pet. App. 119-120). There is thus no assurance that some employees are not true byssinotics despite negative results on both the questionnaire and the pulmonary function test.

employee education and training (41 Fed. Reg. 56504-56508 (1976)).

During the extensive informal rulemaking proceedings that followed, the textile industry conceded that a dust exposure limit was needed, but contended that equally effective protection could be provided at a dust level less stringent than the proposed standard, through reliance on respirators and medical transfers.[14] The industry also attacked the technological feasibility of the proposed PEL as applied to textile processing operations from spinning through weaving,[15] and it claimed that the standard as a whole was not economically feasible or achievable within the proposed seven-year implementation period. On the other hand, employee representatives attacked the standard as too lenient and advocated a 100 ug/m^3 PEL in all operations.

1. *The Secretary's Health Determinations and Dust Control Strategy*

The Secretary found overwhelming support in the rulemaking record for the proposition that textile workers face a severe hazard of byssinosis in most operations both at the proposed level of 200 ug/m^3 and below. Even at 200 ug/m^3, workers in all operations except slashing

---

[14] The industry advocated that the PEL be set at 500 ug/m^3 for all textile operations except slashing and weaving; for those operations, the industry recommended an exposure level of 1000 ug/m^3 (43 Fed. Reg. 27355-27360 (1978)). The industry claimed that its data showed a very low prevalence of disease at 500 ug/m^3 in yarn manufacturing, thus contradicting Dr. Merchant's results. The industry contended, therefore, that only a small number of medical transfers would be necessary in connection with the industry's proposed limit and that that number of transfers was within the capability of the industry (*ibid.*).

[15] The industry conceded that the Secretary's proposed limit was technologically feasible in the initial processes of opening through roving.

and weaving face a 13% risk of byssinosis. At the industry's proposed 500 ug/m^3 level, that risk is doubled.[16]

Based on the testimony of many medical witnesses (*e.g.*, J.A. 401-405, 411), the Secretary concluded that the standard could not be effective unless it was aimed at curbing all grades of byssinosis. "[B]yssinosis represents a continuum of disease," and "the diminished state of health of grade ½ byssinotics is a stage of the pro-

---

[16] Dr. Merchant's dose-response curve showed the existence of risk at exposure levels approaching zero in yarn manufacturing operations, and the record affirmatively demonstrated that no safe level of exposure existed (43 Fed. Reg. 27358 (1978)). The industry relied upon certain other studies in attempting to show that the prevalence of byssinosis was not as high as Dr. Merchant suggested. The Secretary found the industry data deficient, however, because the reported prevalence of disease was not accompanied by adequate dust level data in many instances. For example, the Cone Mills survey (Pet. App. 126-136) provided no dust level data, and the Burlington and West Point Pepperell surveys gave only "assigned" ranges (Pet. App. 161-163, 187). A dose-response curve similar to Dr. Merchant's could not be constructed on the basis of such data. Moreover, the actual exposure levels in the mills studied by the industry were generally much lower than the 500 ug/m^3 level that the industry advocated and often the worker populations in such mills had been part of an on-going worker surveillance program. That was the difficulty with respect to the mills studied by Morgan and Weill. 43 Fed. Reg. 27356, 27358 (1978). The Secretary noted that "[t]he Weill study in particular demonstrates the difficulties inherent in analyzing epidemiological data collected using a mixture of either very clean or very dusty mills." *Id.* at 27358. Furthermore, the industry's low prevalence claim was based on data collected through a questionnaire, and the validity of the data could depend on the manner in which the questionnaire was administered. Indeed, other investigators had noted a rough equivalency between rates of prevalence identified by questionnaire and by pulmonary function testing (43 Fed. Reg. 27357 (1978)), whereas the industry here found a much higher rate through pulmonary function testing, thereby casting further doubt on the industry data (8%-11.8% vs. 1%-3%). Because of the marked disparities between the industry's data and those collected by independent public health investigators, together with the deficiencies in the industry's methodology, the Secretary regarded the industry's data as having questionable validity (43 Fed. Reg. 27359 (1978)).

gressive development with prolonged exposure to cotton dust to an ultimately irreversible respiratory disease" (43 Fed. Reg. 27354 (1978)). Because acute symptoms are often disregarded by workers and may therefore go undetected, the Secretary stated, it is necessary to protect such workers before the condition becomes irreversible (43 Fed. Reg. 27354 (1978)).

The Secretary concluded that the best way to reduce the prevalence and risk of disease is to reduce dust levels to the extent feasible through engineering controls. The Secretary's conclusion was supported by substantial medical and scientific evidence suggesting that reduction of dust levels should be the main objective of the standard (Pet. App. 51-52 & n. 87).[17]

The Secretary rejected the industry's plan for less stringent dust control combined with reliance on transfers and respirators. First, the Secretary doubted the industry's assumption of low disease prevalence at the 500 ug/m^3 level (see note 16, *supra*). Second, Dr. Merchant's study suggested that a quarter of the relevant population would be diseased at that level, while the textile industry claimed that it could transfer no more than 10% of its workforce (J.A. 445-446). It was evident, therefore, that transfers could not play a sufficiently major role in employee protection.[18] Third, respirators were not acceptable because of their documented unreliability, their in-

---

[17] The National Institute for Occupational Safety and Health (NIOSH) had recommended, based on a thorough review of the medical literature, that the new standard impose the lowest feasible limit on dust concentrations, but in any event no higher than 200 ug/m^3 (J.A. 175). In addition to NIOSH's recommendation, Dr. Merchant testified that he favored a reduction to 100 ug/m^3 (J.A. 52). Dr. Hans Weill recommended that the level be set between 200 ug/m^3 and 500 ug/m^3 (J.A. 156).

[18] Under the industry plan, 60% of the diseased population could not be transferred. Indeed, the Secretary concluded that it was only at the 200 ug/m^3 level that the number of necessary transfers would be within the capability of the industry (43 Fed. Reg. 27359 (1978)).

ability to protect employees with impaired breathing, and their associated safety hazards (43 Fed. Reg. 27384 (1978)).

The Secretary also considered and rejected more stringent exposure limits. In the yarn manufacturing processes, the Secretary concluded that the employee representatives' proposal of 100 ug/m^3 was not within the "technological capabilities of the industry." 43 Fed. Reg. 27360 (1978). With respect to weaving operations, the Secretary noted that "engineering dust controls in weaving may not be feasible even with massive expenditures by the industry." *Ibid.* See also J.A. 247-248 (necessary changes would have required reconstruction of 90% of the weave rooms). In this regard, one study had estimated that nearly 60% of compliance costs would be concentrated in the weaving sector and that the impact on the industry would thus be severe (J.A. 74, 125-130). Rather than require these apparently infeasible expenditures, the Secretary determined that optimal worker protection would be served by concentrating "resources on achieving 200 ug/m^3 in yarn manufacturing as rapidly as feasible * * *." 43 Fed. Reg. 27360 (1978). Accordingly, the Secretary set the roughly equivalent levels of 200 ug/m^3 in yarn manufacturing and 750 ug/m^3 in slashing and weaving (see page 3, note 4, *supra*).

2. *The Feasibility of the Standard*

The Secretary also carefully assessed the technological feasibility and the economic consequences of the final standard. Before publishing his proposal, the Secretary had contracted with Research Triangle Institute (RTI) to conduct a technological assessment and economic impact analysis. During the rulemaking, interested parties supplied much additional technical and economic information. The Secretary concluded on the basis of these data that the final PEL's—750 ug/m^3 in weaving and 200 ug/m^3 in the remaining operations—were both technologically achievable and well within the financial capabilities of the industry.

a. *Technological Feasibility*

The industry conceded that it could achieve the 200 ug/m^3 level in the initial processes, opening through roving,[19] through conventional dust control techniques, including local exhaust ventilation. The industry maintained that it was technologically impossible, however, to achieve that level in the later operations, spinning through weaving,[20] and it therefore challenged the RTI study's premise that local exhaust ventilation was suitable for those operations. In setting the final standard, the Secretary generally agreed that local exhaust ventilation has greater limitations in operations beyond roving, but he did not believe that the lower levels could not be achieved (43 Fed. Reg. 27362-27363 (1978)). Indeed, record evidence showed that dust levels in operations beyond roving were already quite low, although the industry had not devoted much effort to dust control in these operations.[21]

In addition, other effective techniques were also available to reduce dust levels. Processes are not generally isolated in the mills, but something as simple as closing the door between the weave room and other processing areas could reduce levels by preventing the migration of dust (J.A. 83-84; see also J.A. 13). Enhanced filtration of air circulated by the general ventilation system would

---

[19] In these operations, the raw cotton is cleaned and formed into strands suitable for spinning.

[20] In "spinning," the processed cotton is spun into yarn. In "winding," "spooling," "twisting," and "warping," the spun yarn is packaged for weaving or other processing. In "slashing" and "weaving," the yarn is treated with sizing and woven into fabric.

[21] In spinning, for example, raw data supplied by ATMI showed that the dust levels of 30 out of 46 (65%) spinning operations were already below 200 ug/m^3. That sample included operations spinning 100% cotton, which is conceded to be the dustiest variety (App. 3490-3560). In weaving operations, the ATMI data showed that 87% of the operations were within the 750 ug/m^3 limit (*ibid.*), while data collected by Hovan Hocutt, a ventilation expert, showed that 72% of the weave rooms already complied with the final standard (J.A. 247-248, 465).

likewise prevent recirculation of contaminated air (J.A. 11, 168-169, 414). Moreover, some witnesses recognized that dust levels in later operations would be lowered if the earlier processes were subject to the most efficacious cleaning (J.A. 10-11, 287, 469). Because the industry's projections of achievable dust levels were based solely on the difficulty of using local exhaust ventilation techniques, the Secretary concluded that the established exposure levels were, as a general matter, within the technological reach of the industry. 43 Fed. Reg. 27366-27367 (1978).[22]

b. *Economic Feasibility*

In the rulemaking proceedings, the assessment of the economic impact of the 200 ug/m^3 level upon the industry was dominated by consideration of the cost of the engineering controls necessary to achieve that level. At the outset, the Secretary had contracted with RTI to study the economic impact of alternative standards. That process continued with the issuance of the proposed standard and the agency's solicitation of views as to how the expected costs might be financed. 41 Fed. Reg. 56498 (1976). The rulemaking proceedings produced voluminous information. See page 4, note 6, *supra*. The quantitative and qualitative information adduced in the rulemaking permitted the Secretary not only to compare the dollar estimates provided by the various parties, but also to examine critically both the methodology and the technological and economic assumptions upon which those estimates were based. In this way, the Secretary was able to make an independent feasibility determination. In simplest terms, the Secretary concluded that RTI had based its dollar estimate on the need for greater technology than was necessary and that the industry had underestimated the efficacy of the technology it had costed.

The RTI study estimated that $2.4 billion would be required to meet a uniform level of 200 ug/m^3 in all

---

[22] The issue of technological feasibility is not presented in this case (see ATMI Br. 8 n.16).

textile operations; that estimate included $1.3 billion in costs attributable to meeting the 200 ug/m^3 level in weaving operations, which was not required by the final standard (J.A. 74). The industry produced the Hocutt-Thomas cost estimates, which were based on an ATMI survey and methodology that the industry declined to disclose fully (J.A. 388-397, 465-468). The industry's submission estimated that costs of $543 million would be required to achieve 200 ug/m^3 in opening through roving, 500 ug/m^3 in spinning through warping, and 1000 ug/m^3 in weaving (J.A. 234-251; Pet. App. 155-156). The industry submitted no cost estimates for lower levels in operations beyond roving, because it claimed that further reductions were impossible.

Other parties, including the Council on Wage and Price Stability (J.A. 333-335), presented data and information showing that existing trends toward modernization and technology changes should be considered in assessing the economic feasibility of a standard (J.A. 266-286). Although the RTI and industry estimates were both premised, for instance, on a compliance strategy that relied exclusively on "retrofitting" or adaptation of old equipment, the record showed that on-going modernization would necessarily result in significant cost savings.[23]

---

[23] For example, Dr. Parker Reist of the University of North Carolina testified that new, high-speed carding machinery was cleaner, more productive, and less costly per unit of production. In addition, the elimination of picking operations through use of high speed chute feed cards constituted a significantly less costly alternative to retrofitting. Dr. Reist explained that high-speed cards attaining speeds of 80-120 pounds of cotton per hour had recently become available (J.A. 298-300). For purposes of dust control, however, air flow requirements per card remained roughly the same (*id.* at 300-301). Moreover, high speed cards can be used to provide substantially increased capacity for the same cost of air flow. Alternatively, the number of cards can be reduced, thereby maintaining the same total hourly capacity at lower air costs (J.A. 293-294, 300-301, 477-480). One mill found that the expense of retrofitting 139 low-speed cards would cover the purchase of 32

RTI's estimate was overstated in three other significant respects. First, RTI derived a unit cost per machine for applying local exhaust ventilation to achieve the 200 ug/m^3 level (J.A. 88-95). The Secretary had concluded, however, that this costly technique would not be necessary for some operations. In spinning through warping, for instance, the Secretary found that many mills had already met the 200 ug/m^3 level, and that necessary reductions would occur because of lower dust levels in prior operations (without additional cost) and through isolation of processes and enhancement of the broken ends collection system on spinning frames.[24] See pages 13-14, *supra*. Thus, RTI's estimate that $493 million would be required to achieve the 200 ug/m^3 level in spinning operations was wholly unrealistic. 43 Fed. Reg. 27366-27367 (1978). Second, RTI's estimate assumed that all existing machinery should be taken into account,

---

high-speed cards with increased capacity and lower operating costs (J.A. 304-306).

Greater dust control will also result when a mill chooses, for production reasons, to replace traditional ring-spinning frames with open-end spinning frames. A traditional ring-spinning frame is difficult to control, whereas an open-end frame has built-in controls and requires only the filtration system (J.A. 470-471). An open-end frame also has the dust-control advantage of eliminating both the preceding roving operation and the subsequent winding operations. One mill found that a decreased unit cost of production resulted from this conversion (J.A. 476-477). Although open-end spinning is not suitable for all operations, it was expected that this new technology will grow from 5% to 30% of the spindles in the industry (J.A. 459).

[24] The Hocutt-Thomas analysis estimated that enhancement of the broken-ends collection system would cost $17.7 million (J.A. 251, 486; Pet. App. 155-156). The Secretary recognized that local exhaust ventilation was not as applicable in weaving operations as in other operations, but RTI's $1.2 billion estimate for achieving 200 ug/m^3 in weaving depended on that technique (43 Fed. Reg. 27367 (1978); J.A. 91-95). Similarly, the Secretary found local exhaust ventilation largely unnecessary in spinning, winding, spooling, twisting and warping, but RTI's estimate included $620 million for such controls (43 Fed. Reg. 27366-27367 (1978)).

regardless of whether the machinery was being used to process pure cotton, pure synthetics, or a blend. Machines that are isolated and process pure synthetics would not need to be controlled, however, because the ambient dust would not contain cotton. Moreover, blends produce substantially less dust because "synthetic fibers are virtually trashfree and contribute little" (J.A. 9) to the ambient air concentration (J.A. 9, 30, 50, 90-91, 133, 136-137). RTI admitted that this incorrect assumption could have increased its overall compliance cost estimate by 30% (J.A. 90-91, 133, 136-137). Third, RTI assumed that the entire industry stood on the same footing, that no prior dust control expenditures had been made, and that dust levels were at uniform levels throughout the industry (J.A. 85-90).[25] However, the evidence adduced at the hearings disclosed a range of dust levels within the industry, as well as significant pre-existing compliance with the levels prescribed in the final standard.

In addition to the RTI estimate, the Secretary had one other comprehensive cost estimate: the Hocutt-Thomas calculations that were based on the ATMI data. Based on his comparison of the two estimates, the Secretary concluded that "[s]ince ATMI estimates are based on the most recent data, OSHA believes them to be more realistic than those offered by * * * RTI" (43 Fed. Reg. 27373 (1978)). While RTI had been unable to assess the extent of current dust controls, Hocutt had the benefit of such information reported in ATMI's survey (J.A. 236-238). The Hocutt-Thomas estimates also provided a reasonable reference in cases where the record showed that RTI's

---

[25] While RTI had access to some data on actual dust levels and industry efforts to implement dust control, RTI was not able to survey the industry to determine the extent to which its projected costs would actually have to be incurred (J.A. 418-420). This limitation also resulted in overstatements with respect to estimates for nonengineering costs because the record showed, for example, that medical surveillance programs had been established in some mills, thereby obviating the need for incurring initial costs in that area.

control cost estimates were overstated. In weaving, for example, the Secretary noted that raising the PEL to 750 ug/m^3 meant that "the need for certain engineering controls and/or amounts of air and filtration would be changed [and] costs [would] be reduced significantly" (43 Fed. Reg. 27371 (1978)). Because the Secretary believed that better dust control would result from the expense identified by Hocutt-Thomas, he "adopted the Hocutt-Thomas estimate for slashing and weaving which predicted a level of 1000 ug/m^3 instead of the RTI estimate for slashing and weaving at 200 ug/m^3" (*ibid.*).

Although the Hocutt-Thomas cost estimate was premised in part upon PELs that were higher than those mandated by the final standard, the Secretary concluded that this estimate also was overstated in several important respects. The Hocutt-Thomas estimate, like that of RTI, was based on retrofitting costs, and it thus overstated actual costs to the extent that modernization and technological innovation would otherwise occur (43 Fed. Reg. 27372 (1978). Similarly, the Hocutt-Thomas estimate did not account for the already low levels in many operations or the fact that more stringent controls in earlier operations would, without additional cost, result in less dust in later operations (see pages 13-14, *supra*).[26] Finally, the Hocutt-Thomas calculations may

---

[26] Thus, Hocutt estimated that $41 million would be required to meet a 500 ug/m^3 level in winding, spooling, twisting and warping, whereas the Secretary believed that, given the already low levels in these operations, further reductions could be effected through maximum cleaning in prior operations, isolation of processes, and enhancement of general ventilation. 43 Fed. Reg. 27362-27364, 27366-27367 (1978). Hocutt also noted that dust capture systems on winders could handle 20,000 cubic feet of air per minute, although he costed only the price of half that volume to achieve 500 ug/m^3. He also pointed out several spooler modifications that would improve performance beyond the 500 ug/m^3 that he had calculated. For twisters, Hocutt provided no estimate because he had concluded that these machines could not be controlled with local exhaust ventilation. The cost with respect to warpers likewise was not estimated because Hocutt stated that dust levels

also have included costs for machines processing synthetic material. These overstatements tended to offset any differences in cost attributable to the fact that the Hocutt-Thomas estimates were premised in part upon higher dust levels. The Secretary was unable to adjust the Hocutt-Thomas estimates further, however, for several reasons, including the fact that the industry refused to disclose much of its supporting data and methodology (43 Fed. Reg. 27373 (1978)). Nonetheless, based on the record, the Secretary believed that his adjusted estimate, amounting to $550 million in capital costs, was sufficiently reliable to assess the economic impact of the standard (*ibid.*).

The Secretary concluded that the industry as a whole could well afford costs in the $550 million range, to be incurred over a four-year period. This conclusion was based largely on RTI's extensive analysis of the impact of various cost levels on the industry's structure, its rates of return, and its profits, in light of its competitive position with respect to synthetics and imports (J.A. 95-150).[27] RTI also reported that the industry's capacity was currently under-utilized and that the capital required for compliance costs thus would not displace other capital needs (43 Fed. Reg. 27377 (1978)).

RTI examined capital costs per dollar of sales and found these costs to be small in the yarn manufacturing sector for both RTI's $211.8 million (500 ug/m^3) and $984.4 million (200 ug/m^3) capital requirements estimates. The increase in costs amounted, respectively, to only 1.7 and 7.8 cents per dollar of sales (J.A. 96). Because the capital costs of the final standard for this

---

would be 500 ug/m^3, but he did note that these machines were amenable to some controls (J.A. 245-250).

[27] While the Secretary disagreed with RTI's cost estimates because of certain incorrect assumptions about the current state of dust control in the industry, as well as strategies necessary to achieve further dust control, RTI's analysis of the industry's ability to handle various levels of costs was based on unrelated data that were not subject to the same criticism.

sector were estimated at $467 million, it was clear that increased costs per dollar of sales would be small. RTI also calculated the price increases that would be required, given various compliance costs, to maintain the previous rate of return on investment. For the $211 million in capital costs that RTI estimated for a 500 ug/m^3 dust level, necessary price increases ranged from less than 0.1 cent per dollar of sales to 1.6 cents per dollar of sales. Given the $984 million costs RTI anticipated for a 200 ug/m^3 dust level, the necessary price increases ranged from 0.5 cents to 6.3 cents per dollar of sales (J.A. 97-102).[28]

In addition, RTI examined the competitive posture of cotton and the textile industry. RTI judged competition from synthetics not to be significant. Synthetics had penetrated the market to its limits, and there remained an irreducible demand for cotton products. Moreover, the price differential was unlikely to remain so heavily in favor of synthetics in view of the escalating costs of petroleum (43 Fed. Reg. 27350, 27370 (1978)).[28a]

RTI also noted that import restrictions were in force under a number of textile trade agreements and that the annual allowable rate of growth of imports was set in the most recent agreement at the 6%-7% range. Moreover, international monetary changes since 1971 had resulted in sharply increased levels of American textile exports

---

[28] In weaving, the final standard was calculated to increase costs by only slightly more than 0.13 cents per dollar of sales (J.A. 124).

[28a] RTI noted that synthetics had gradually achieved a 70% share of domestic fiber consumption, but that factors other than the price differential between cotton and synthetic fiber would govern any further shifts. It is difficult and costly for a mill to change the ratio of cotton to synthetics in its processing machinery. Moreover, fluctuations in consumer demand for major cotton products—men's wear and home furnishings (sheets and towels)—is relatively independent of price (J.A. 140-146). Arthur Figh, a leading textile financial expert and vice-president of the Chase-Manhattan Bank, agreed that synthetics were unlikely to displace cotton any further (J.A. 474-475).

(J.A. 146-150). RTI concluded that small changes in the relative prices of domestic and foreign textile products would have "very little impact" on the domestic textile industry, "and, in general, the trade agreements dampen the effects on domestic markets of small changes in relative prices" (J.A. 150).

In charting the maximum potential inflationary impact, as well as the long-run economic consequences on employment levels and cotton products demand, RTI assumed the occurrence of the necessary price increases that it had calculated. RTI found that these long-term effects would be minimal even for costs as high as $984 million.[29] Thus, as ATMI contends (ATMI Br. 27), RTI did perform analyses that assumed a full pass-through of costs, but, significantly, RTI concluded that the long-term detrimental effects of such price increases were not significant. In view of this conclusion and of RTI's determination that interfiber and international competition were not constricting factors, RTI's judgment that prices would rise over time to generate revenues that would cover costs (J.A. 172-173) was fully warranted.

By comparing ratios of costs to annual profits, RTI also analyzed the short term effect of compliance costs with respect to financing. These ratios indicated both the internal availability of funds and the industry's ability to

---

[29] Using a price elasticity analysis, RTI calculated that price increases due to $984.4 million in compliance costs would decrease demand by only 3%-4% and that compliance costs of $211 million would lead to a demand decrease less than 1% (J.A. 113-124). Thus, only a small decrease in demand would result from $467 million in compliance costs, and the impact on cotton growers would be minimal. National Cotton Council's contrary assertion (Br. 20-22) is based on the grossly inaccurate assumption that compliance costs would exceed $2 billion. Moreover, National Cotton Council's contention (Br. 16) that RTI erroneously used short-term elasticities is insubstantial. RTI explained that long-term elasticities were unavailable (J.A. 114-115). In addition, RTI's judgment that competition from synthetics and imports was not significant meant that the long-term effects of price increases would not differ substantially from those calculated from short-term elasticities.

borrow from external sources. Although RTI assumed for these calculations that prices would rise to maintain pre-standard profits, this assumption was supported by studies showing relatively small short-run demand price elasticities, indicating a capacity for passing on cost increases through price increases (J.A. 113-120).[30] These ratios were substantial for the nearly $2.4 billion in capital costs that RTI had estimated for a 200 ug/m^3 level, especially in the weaving sector, but they were significantly smaller for the $221 million estimated for a 500 ug/m^3 level. The cost effects were an element in the Secretary's feasibility determination that led to the decision to set a higher limit in weaving operations (J.A. 125-130). As the Secretary explained, the estimated costs of the final standard—$550 million—fell between those figures, and the unfavorable ratios identified by RTI accordingly would decline dramatically (43 Fed. Reg. 27378 (1978)).

On the basis of these calculations, the Secretary concluded that the $550 million compliance costs required by the final standard were within the industry's financial ability, given a four-year period for implementation of engineering controls, and would have an adverse impact on only a few marginal firms (43 Fed. Reg. 27378 (1978)). The Secretary also concluded that the standard meets the statutory criteria set forth in Section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5), because the standard's requirements are necessary to provide the required protection and are economically and technologically feasible (43 Fed. Reg. 27378-27379 (1978)). The Secretary rejected the contention that he was required to perform a cost-benefit analysis after he had determined that the

---

[30] RTI also determined that, given the extreme assumption that no price increases could occur, all sectors of the yarn manufacturing industry would remain profitable, on the average, for the low costs of the 500 ug/m^3 level, and only one sector would experience negative return for the large costs of the 200 ug/m^3 level (J.A. 97-99).

new standard would yield appreciable benefits [31] and that it was feasible. The Secretary noted that Congress had performed a categorical "cost-benefit" analysis in this area, striking the balance to provide for the maximum feasible protection against significant risks of material health impairment. Because the Secretary concluded that the standard fulfilled Congress' mandate, he had no authority to weigh necessarily speculative costs and benefits to promulgate a different standard (43 Fed. Reg. 27378 (1978)).

3. *The Medical Transfer and Income Protection Provision*

Respirators will be widely used for a substantial interim period under the final standard. Consequently, the Secretary addressed the difficulties involved in the use of respirators and established protections for employees who are unable to use them (43 Fed. Reg. 27386-27387 (1978); J.A. 164-166, 217-218, 312-315, 316-319, 320-321).[32] Whether an employee can wear a respirator is a determination that must be made by a physician, but experience with past medical screening programs has shown that many workers deny or minimize work-related health problems because they fear being discharged or transferred to lower paying jobs (J.A. 210-212, 218-220, 323-324, 435-436). Thus, the Secretary recognized that accurate information could be obtained and health adequately protected only if employees understood that they would not be adversely affected because of their candor (43 Fed. Reg. 27387 (1978)). Moreover, the Secretary

---

[31] A qualified calculation based on Dr. Merchant's dose-response data showed that the new standard would prevent nearly 5,000 new cases of byssinosis each year (43 Fed. Reg. 27379 (1978)).

[32] While it was generally agreed (J.A. 314-315, 323-324, 383-384) that such persons should be transferred, the industry contended that transfers should be limited to workers who manifest grade 3 symptoms, that transfers should be voluntary, and that the workers' pre-transfer pay and benefits should not be guaranteed (J.A. 383-384, 446-447).

recognized that income protection is necessary to fulfill Congress' intent to place safety costs upon employers, rather than employees (*ibid.*) Finally, the Secretary determined that transfers only of grade 3 byssinotics—that is, those workers who had already contracted chronic disease—would not satisfy the prophylactic purposes of the Act. Accordingly, the Secretary provided in the standard that when a physician determines that an employee cannot wear a respirator, the employee must be allowed to transfer to another position having a dust level at or below the PEL, if one is available, with no reduction in wages or employment rights. 29 C.F.R. 1910.1043(f)(2)(v) (Pet. App. 8-9).

D. The Decision of the Court of Appeals

On petition for review under 29 U.S.C. 655(f), the court of appeals upheld the cotton dust standard as applied to petitioners. The court observed that the appropriate standard of review is whether substantial evidence in the record as a whole supports the Secretary's determinations and that its role is "to ensure that the agency has (1) acted within the scope of its authority; (2) followed the procedures required by statute and by its own regulations; (3) explicated the bases for its decision; [and] (4) adduced substantial evidence in the record to support its determinations" (Pet. App. 43; footnotes omitted).

The court of appeals extensively reviewed the record in light of petitioners' contentions. The court concluded that the Secretary had justifiably relied upon the Merchant dose-response data and that the Secretary's determination that the standard should seek to eliminate acute byssinosis, as a means of eliminating the chronic disease, was based on the law and the evidence (Pet. App. 46-53).

Although the industry claimed that the Secretary had ignored its proposed alternative, the court of appeals found that the Secretary had carefully considered that plan and had correctly concluded, on the basis of sub-

stantial evidence, that the industry's studies were deficient (Pet. App. 47-49). The court noted in addition that the Secretary, in disfavoring respirators, had acted on the basis of uncontradicted evidence of health risk and pursuant to the express statutory policy of placing the burden of compliance on employers (*id.* at 49-50). Likewise, the Secretary had properly rejected the unsupported assumption that sufficient jobs existed to permit large scale reliance on a transfer program (*id.* at 49). The court also found extensive evidence showing the necessity for principal reliance upon a stringent dust control strategy (*id.* at 51-52).

The court of appeals found ample proof of technological feasibility, based on technical data and dust readings submitted by the industry, RTI, and NIOSH, all of which showed that certain firms within the textile industry had already substantially complied with the requirements of the standard (Pet. App. 55-61). With respect to economic feasibility, the court concluded that the Secretary had "marshal[led] sufficient support and analysis for [his] decision to use the industry's capital cost estimate" (*id.* at 65). In the court's view, the evidence supported the conclusion that RTI's cost estimates were overstated to the extent that they were based on the retrofitting of old machines, without taking account of new machinery that would be installed in the ordinary course (*id.* at 63). Moreover, the Secretary's assessment that the costs estimated by the industry would result in greater dust reduction than the industry had assumed also justified the conclusion that "even the industry capital estimates were exaggerated * * *" (*id.* at 65). Given the unavailability of more precise data and estimates, due in part to the industry's refusal to cooperate, the court found that the Secretary had reasonably relied on the industry's cost estimate, as adjusted (*id.* at 65-66).

The court of appeals further concluded that the Secretary had properly relied on evidence showing that industry revenues would rise to cover compliance costs

(Pet. App. 67-69). While recognizing that the standard might result in the closing of some marginal firms, the court noted that the feasibility of a standard must be determined by reference to the industry as a whole. Thus, the court found substantial evidence to support the Secretary's determination that the standard would not affect the viability of the textile industry.

The court of appeals also squarely rejected the contention that the Secretary was required to perform a cost-benefit analysis to show either that the standard was feasible or that it was "reasonably necessary or appropriate" (Pet. App. 69-77). The court noted that Congress had already struck the balance between costs and benefits in Section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5), and that, in contrast to other statutes, neither the language nor the legislative history of the Act contained any suggestion of a cost-benefit test. Congress had clearly rejected attacks premised on the ground that the Act was too expensive and had directed "that any *severe* risk to employee health must be eliminated or reduced if feasible means to do so exist" (Pet. App. 74) (emphasis supplied). Thus, the court was not free to impose the additional requirement of a cost-benefit test.

Finally, the court of appeals upheld the Secretary's authority to assure the successful implementation of the respirator and medical surveillance program by requiring income protection for transferred employees. The court found that this provision was "reasonably necessary or appropriate to provide safe and healthful employment" because, absent the provision, employees who are unable to wear respirators "would be forced to suffer continuing exposure to impermissibly high dust levels or else risk disadvantageous transfers, or even risk losing their jobs" (Pet. App. 97). This cost, like other costs of health protection, was appropriately assigned to the employer (*id.* at 97-98).[33]

---

[33] The court of appeals remanded the standard, as applied to the cottonseed processing industry, for a reassessment of its economic impact on those employers (Pet. App. 86-93). Although the court

SUMMARY OF ARGUMENT

The Secretary set the present cotton dust standard, which was upheld in relevant part by the court of appeals, based on his determination that the prior standard presented a significant risk of material health impairment that the new standard would substantially reduce. The cotton dust standard therefore meets the threshold requirement identified in *Industrial Union Department* v. *American Petroleum Institute* (*"Benzene"*), No. 78-911 (July 2, 1980). In accordance with the statutory mandate that "the standard [be set] which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if [he] has regular exposure to the hazard dealt with by such standard for the period of his working life" (Section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5)), the Secretary considered voluminous technological and economic evidence and concluded that the requirements of the standard are feasible. The Secretary also considered alternatives submitted by the industry and employee representatives. The industry alternative was rejected because it did not provide the degree of protection required by the statute, and the employee representatives' alternative was rejected because it was not feasible. The Secretary's determinations were based on substantial evidence, as the court of appeals correctly held, and the judgment below should be affirmed.

---

upheld the standard as applied to cotton classers and warehouses, the Secretary has since suspended application of the standard to these employers pending administrative reconsideration of the health risk in light of this Court's decision in *Industrial Union Department* v. *American Petroleum Institute*, No. 78-911 (July 2, 1980). See 45 Fed. Reg. 50328-50329 (July 29, 1980). Accordingly, the Secretary acquiesced in a writ of certiorari to vacate the judgment as to these employers and to remand the standard to the agency. See *Cotton Warehouse Ass'n* v. *Marshall*, No. 79-1789 (Oct. 6, 1980).

Petitioners challenge the standard on three grounds, all of which lack merit. First, petitioners contend that the Secretary must not only meet the *Benzene* test and then determine that the standard is economically and technologically capable of achievement, but that he must also conduct a cost-benefit analysis and determine, with respect to each standard, that the anticipated costs bear a "reasonable relationship" to the anticipated benefits. The language and scheme of the Act provide no basis for that contention, and the extensive legislative history of the Act contains not a single suggestion that the Secretary must weigh costs and benefits in setting standards. Moreover, because Congress did not contemplate that the Secretary would weigh costs and benefits, there is nothing in the Act or legislative history to guide the Secretary in ascertaining whether a "reasonable relationship" exists or in determining what value he should place on human life and freedom from suffering. At bottom, petitioners' argument speaks only to public policy considerations. Whatever the merit of that argument, it is one that must be addressed to Congress.

Second, petitioners contend that the Secretary's economic feasibility determination was not based on "substantial evidence." While the Secretary had voluminous evidence concerning that question, petitioners apparently challenge his determination on the ground that he relied on parts of various cost estimates, rather than on the totality of a single submission. The record shows that the Secretary carefully considered the evidence and tested the assumptions underlying the various estimates, and that his conclusions were fully reasoned and fully explained. The Act clearly requires that the Secretary base his decision on "the best available" evidence, and there is no reason to believe that Congress intended for him to abdicate his judgment by accepting or rejecting one or another submission in its entirety. Rather, the Secretary is required to analyze critically the evidence that he receives, as he did here.

Finally, petitioners assert that the Secretary lacks authority to require the transfer to other available jobs, without loss of pay, of workers who cannot wear respirators. The Secretary found that the respirator program would not be effective in protecting against the risk of disease without a transfer and income protection provision, because workers in unhealthful workplaces who are unable to use respirators are unlikely to come forward with that information if they would thereby face unemployment or, at the very least, transfer to a lower-paying job. Moreover, transfers without income protection would place the costs of compliance on workers, contrary to Congress' intention that that burden should rest on employers. The Secretary thus properly concluded that the transfer and income protection provision is a measure "reasonably necessary or appropriate to provide safe or healthful employment." Section 3(8) of the Act, 29 U.S.C. 652(8).

ARGUMENT

I. THE COTTON DUST STANDARD IS REASONABLY NECESSARY AND APPROPRIATE BECAUSE IT PROTECTS AGAINST A SIGNIFICANT RISK OF MATERIAL HEALTH IMPAIRMENT

In *Industrial Union Department* v. *American Petroleum Institute* (*"Benzene"*), No. 78-911 (July 2, 1980), a plurality of the Court held that the Secretary may promulgate a new OSHA standard only when he has met the threshold burden of showing that the existing standard exposes employees to a significant risk of material health impairment that the new regulation will reduce (slip op. 31-32; slip op. 2 (Powell, J., concurring)). As the plurality noted, the Secretary must be afforded substantial discretion in determining whether risks are significant: "[W]hile the Agency must support its finding that a certain level of risk exists by substantial evidence, we recognize that its determination that a particular level of risk is 'significant' will be based largely on policy

considerations" (slip op. 45 n.62).[34] The cotton dust standard clearly meets the threshold requirement identified in *Benzene.*

The previous standard for cotton dust allowed an exposure level of 1000 ug/m^3 of total dust, or approximately 500 ug/m^3 of respirable dust, in most textile operations. See page 3, note 4, *supra.* The dose-response curve based on the studies of Dr. Merchant and his colleagues, which the Secretary determined to be "the most thorough and objective evaluation of byssinosis prevalence in the United States textile industry" (43 Fed. Reg. 27355 (1978)),[35] indicated that workers exposed at that level face a one in four risk of contracting some grade of byssinosis and a one in 15 risk of grade 2 byssinosis (*ibid.;* J.A. 40; 41 Fed. Reg. 56504 (1976)). The risk of grade 3 byssinosis (chronic disease) is far

---

[34] The plurality also remarked that "OSHA is not required to support its finding that a significant risk exists with anything approaching scientific certainty" (slip op. 45). Rather, the Secretary must be afforded "some leeway where [his] findings must be made on the frontiers of scientific knowledge" (*ibid.*). See also slip op. 2 (Burger, C. J., concurring); slip op. 3-4 (Powell, J., concurring).

[35] While industry representatives criticized various aspects of the Merchant studies (see pages 9-10, *supra*), the Secretary concluded that Dr. Merchant's findings provide "a reliable assessment of [the] health risk to cotton textile workers from cotton dust" (43 Fed. Reg. 27357 (1978)). The Secretary noted that "the Merchant data has been published and subject to peer review for several years without any major reported challenge to its basic soundness" (*ibid.*). Indeed, only Dr. Moon Suh of Burlington Industries presented any colorable criticism of the Merchant study and, as the Secretary pointed out, Dr. Suh's criticisms were convincingly rebutted at the hearing by Dr. Merchant and others. See 43 Fed. Reg. 27357-27358 (1978). As the Secretary stated, "the dose-response data of Merchant, supported by numerous other studies * * *, is the best available evidence and * * * it provides the Agency with sufficient evidence upon which to take action * * *." 43 Fed. Reg. 27358 (1978). Contrary to ATMI's contention (ATMI Br. 14-15), the Secretary's standard was based not merely on "policy," but on documentation of serious disease.

greater than one in 1000.[36] That risk is manifestly significant. See *Benzene, supra,* slip op. 44-45. Likewise, as demonstrated at some length above (see pages 4-12, *supra*), it is beyond question that byssinosis constitutes a "material impairment of health or functional capacity" in both its acute and chronic forms. Thus, the Secretary reasonably determined that the previous cotton dust standard presented an unacceptable risk of material impairment.[37]

---

[36] Dr. Bouhuys estimated that out of a total population of 235,000 retired and 200,000 active textile workers, 35,000 are permanently disabled (J.A. 154-155; 43 Fed. Reg. 27353 (1978)).

[37] In assessing the risks posed by cotton dust, the Secretary properly considered all grades of byssinosis for several reasons. First, the Secretary found, based on the evidence (J.A. 152-153, 421-423, 434-435), that "grade ½ byssinosis and associated pulmonary function decrements are significant health effects in themselves and should be prevented so far as possible" (43 Fed. Reg. 27354 (1978)). Second, the Secretary also found, based on substantial scientific testimony (see pages 6-8, *supra;* J.A. 151-152), that the prevention of chronic disease necessarily requires the prevention of grade ½ byssinosis and other acute responses to cotton dust because byssinosis is a "continuum of disease," and persons manifesting acute symptoms are more susceptible to chronic disease. In many cases, therefore, further exposure "progresses inevitably to the chronic irreversible respiratory diseases associated with cotton dust exposure" (43 Fed. Reg. 27354 (1978)). See note 11, *supra.* The Secretary's determination to set a standard designed to eliminate these acute symptoms therefore constitutes a sound and justifiable policy of prevention. See *Benzene, supra,* slip op. 45. Moreover, as the court below correctly concluded (Pet. App. 52-53), Section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5), not only permits but requires the Secretary to act to prevent chronic disease by protecting workers from the milder forms of byssinosis. That section directs the Secretary to set permanent standards for occuptional exposure to "toxic materials or harmful physical agents" at the level "which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity *even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life*" (emphasis added). For many workers, a lifetime of exposure at current levels will result in chronic debilitating, often fatal disease.

Although the new standard will not wholly eliminate the risk of byssinosis, the Secretary found that it would substantially reduce that risk. According to the Merchant studies, the new PEL would halve—to 13%—the prevalence of all grades of byssinosis for workers in all operations except slashing and weaving. Given the estimated 125,000 to 200,000 persons at work in those portions of the industry (J.A. 154; 43 Fed. Reg. 27353 (1978)), this reduction would represent a substantial increase in health benefits. Moreover, the record evidence also indicated that the new standard would eliminate many cases of chronic disease (41 Fed. Reg. 56505 (1976); 43 Fed. Reg. 27354 (1978)). For example, Dr. Arend Bouhuys, Director of the Yale University Lung Research Center, stated that "it is also probable that implementation of the [200 ug/m^3] standard would greatly decrease the prevalence of disabling chronic lung disease among cotton textile workers in the future" (J.A. 152; see also J.A. 411).

Indeed, petitioners do not contest the validity of the Secretary's judgments that the previous standard presented a significant risk of material health impairment or that various provisions of the new standard will reduce that risk. Apart from their assertion that the Act requires a cost-benefit analysis (see pages 37-63, *infra*), the thrust of petitioners' attack on the new standard rests on their assertion (ATMI Br. 11-12, 39-40) that the Secretary's standard is no more effective than the industry alternative, which combines a 500 ug/m^3 PEL with reliance on medical surveillance, employee transfers, and widespread respirator use. Both the Secretary and the court of appeals correctly rejected petitioners' factual assertion that their alternative would be equally or approximately as effective in curbing byssinosis.[38]

---

[38] Petitioners' contention that the industry alternative would be equally effective is based on certain dubious factual assertions. In the main, petitioners rejected the Merchant data upon which the Secretary relied, focusing instead on industry studies that purported to show a much lower prevalence of byssinosis among textile workers. The assessment of those conflicting data obviously required ap-

The Secretary's rejection of the industry alternative was based principally on the recognition that a 26% risk of byssinosis exists at the 500 ug/m^3 dust level advocated by the industry.[39] While the Secretary's standard would

---

plication of the agency's expertise, and the Secretary's judgment should not lightly be set aside. As the court of appeals remarked, "OSHA gave serious attention to the medical studies * * * proffered to support the industry's alternative * * * and concluded that their validity had largely been discredited" (Pet. App. 47-48). The court below carefully reviewed the Secretary's extensive discussion of the industry's studies (see 43 Fed. Reg. 27356-27359 (1978)), summarized the Secretary's reasons for rejecting those studies (Pet. App. 48 n.76), and concluded that the Secretary's "judgment on this issue is sufficiently supported on this basis" (*id.* at 48-49).

[39] The validity of Dr. Merchant's risk estimate was challenged at the hearing by Dr. Moon Suh of Burlington Industries (see note 35, *supra*). Dr. Suh's contentions were thoroughly ventilated at the hearing and decided adversely to petitioners (*ibid.*). Petitioners' present reliance (ATMI Br. 9 n.19) on Dr. Suh's assertions is therefore unjustified.

ATMI also seeks to discredit (ATMI Br. 8-9 & nn. 18, 19) the Merchant data on the ground that they measure only prevalence rather than dose-response, and that the prevalence of the disease observed by Dr. Merchant may be related to "presumably higher" dust exposures in the past. Dr. Merchant testified, however, that he carefully designed his study to minimize that problem by choosing mills in which "the process had been stable, where the machinery in place had been stable and had not been changed recently, [and where] the population was relatively stable. So we felt we could minimize the major differences in dust levels in the past" (J.A. 437-438). Although Dr. Merchant and the agency both acknowledged "some weaknesses" in data, such as the small size of some of the populations studied, Dr. Merchant concluded that the data could be used to draw valid dose-response curves with accepted statistical techniques. That conclusion was thoroughly tested at the hearing, and the Secretary concluded that it was supported by the weight of scientific opinion (see pages 5, 10, *supra*). While it is true, as ATMI observes (ATMI Br. 9 n.19), that Dr. Merchant stated that his data could not be used to make a conclusive determination as to the prevalence of byssinosis in the entire textile industry, that is irrelevant. The objective of the study was to develop dose-response data and, for this purpose, Dr. Merchant sought to "get a good distribution of the dust over a large variety of dust

eliminate the risk for 13% of the affected population, the industry alternative would simply attempt to identify, through medical surveillance, those employees who have already exhibited symptoms of acute byssinosis and would permit those employees to transfer before their disease became demonstrably chronic. See generally J.A. 383-384. This industry alternative proposal is unsatisfactory for several reasons.

First, the plan is based on the invalid assumption (see page 8, note 13, *supra*), that a bright line separates chronic and acute forms of the disease. Second, the plan ignores the fact that persons suffering from acute byssinosis are materially impaired (see page 30, note 35, *supra*), and it does nothing to prevent the onset of that condition. Third, the plan assumes, contrary to the opinions expressed by the industry's own experts, that medical surveillance can be a useful *primary* method of disease control at a 500 ug/m^3 exposure level, rather than simply a useful *secondary* control measure.[40] Fourth, the plan's

---

measurements" (J.A. 485). These conditions were available at the mills that Dr. Merchant studied and he was thus able to "find striking dose-response relationships" (J.A. 485). In sum, the Secretary acted here on the "best available evidence," as required by the statute. 29 U.S.C. 655(b)(5). See *Benzene, supra*, slip op. 45.

[40] Medical surveillance as a primary means of combating disease was repeatedly disfavored in the rulemaking proceeding, even by Dr. Imbus, the industry's principal medical expert. Dr. Imbus stated that "[m]edical surveillance programs are not a substitute for diligent efforts to control dust" (J.A. 60), and that, "in order for a medical surveillance program to provide any real protection you must first of all have a manageable situation" (*ibid.*). Dr. Imbus recounted one area in an all-cotton plant with a 400 ug/m^3 dust level, where there was significant incidence of symptoms and decrement of FEV; he noted that "[e]ven though dust levels here do not look inordinately high, it is obvious that further action needs to be taken to lower them, and medical surveillance is strictly an interim measure" (*id.* at 59). See J.A. 439-441, 445 (Dr. Imbus; Dr. Merchant). See also *American Smelting & Refining Co.* v. *OSHRC*, 501 F.2d 504, 515 (8th Cir. 1974) ("[B]iological monitoring did not eliminate or even reduce the hazard; it merely disclosed it. * * * Workers should not be subjected to hazardous concentra-

reliance on transfers and respirators is simply unrealistic even on its own terms. The number of transfers the industry can easily accommodate is necessarily low and would be far below the number necessary at the PEL that the industry proposed. Dr. Harold Imbus testified that "in my experience I don't think [the number of workers who could transfer] could be a very high percentage. Certainly somewhere less than 10 percent, at any rate" (J.A. 446).[41] Respirators are also unsatis-

---

tions of airborne lead; biological monitoring should complement * * * safe air, but is not a substitute for a healthful working environment.").

The shortcomings of any medical surveillance program are obvious. Workers may be less than totally candid in reporting symptoms of chest tightness and breathlessness (see J.A. 436, 485), and increasing familiarity with questionnaires may alter responses (J.A. 410-412). See also Pet. App. 30 n.13. Pulmonary testing may also fail to disclose symptoms of acute byssinosis (J.A. 192-194, 435). Moreover, the success of a medical surveillance program depends upon the abilities and training of the persons administering the program and "[t]he ability of all manufacturers to implement a high quality medical surveillance program * * * is a problem" (J.A. 436). For example, many workers testified that test results had been withheld from them (J.A. 209-216, 218-220), which would signify a misunderstanding of the gravity of acute byssinosis by persons administering such tests. In addition to the usual problems associated with medical surveillance programs, the industry proposal presented further problems by suggesting that principal reliance should be placed on pulmonary function testing, with questionnaires to be used only when such tests showed a deficit (J.A. 383-384). The industry's "active and effective medical surveillance program" (ATMI Br. 11) would therefore fail to detect many persons suffering from the disease. See note 13, *supra*.

[41] Edward Baier, Deputy Director of NIOSH, and Dr. Merchant expressed similar views. Baier remarked that "only a small proportion of the workers can be effectively reassigned * * *" (J.A. 175) and Dr. Merchant stated that "[i]f you have a significant proportion of your people affected there may not be adequate jobs at low dust levels * * *" (J.A. 440-441). The Secretary took such factors into account. The Secretary acknowledged that, under his standard, 13% of textile employees would still be affected by the disease, but he concluded that it "is not beyond the capacity of a

factory as a primary means of combating this disease, as the record showed (J.A. 165-166, 316-322; App. 2374), because they are both unreliable and, like voluntary transfers, place responsibility for compliance on employees, rather than on employers. As the Secretary noted (43 Fed. Reg. 27384 (1978)):

> Some hearing participants recommended a control strategy involving principal reliance on respiratory protection, to reduce the cost of compliance. However, respirators have many disadvantages which preclude primary reliance or co-reliance on respiratory protection on an equal basis with engineering and work practice controls. The many difficulties with respiratory protection were enumerated at the hearing by respirator expert Bruce Held (Tr. 483) [J.A. 412-413]: because of difficulties in face fit, it is difficult to know whether the respirator actually provides adequate protection; respirators, by interfering with vision, hearing, and mobility, can cause safety problems; some employees cannot wear respirators because of breathing difficulties. Finally, it is not appropriate to place the burden of compliance principally on the employee, as would be the case if respiratory protection were the principal means of reducing employee exposure.

In sum, the Secretary demonstrated that the previous standard exposed employees to a significant risk of material health impairment, which the new standard will substantially reduce. Although the industry contends that it suggested a far less costly alternative, the record shows that the Secretary justifiably found that that alternative was not nearly as effective.

---

typical plant to move those [still] affected to a low exposure area." 43 Fed. Reg. 27359 (1978). The industry alternative could not possibly achieve these beneficial results. Thus, the court of appeals correctly concluded that "[t]he industry was unable to show that job transfers would be available in sufficient number to respond to the likely prevalence of byssinosis in plants with dust levels at the 500 ug/m^3 proposed by the industry" (Pet. App. 49).

II. THE SECRETARY'S RESPONSE TO THE SIGNIFICANT HEALTH THREAT POSED BY COTTON DUST IS ECONOMICALLY JUSTIFIED AND REQUIRED BY THE STATUTE

As we have demonstrated above, the Secretary satisfied the *Benzene* threshold requirement in promulgating the cotton dust standard. The question thus presented is one that the plurality expressly reserved in that case: what further criteria must the Secretary use in determining the degree of protection that the statute requires in setting a particular standard. Petitioners contend (ATMI Br. 36-47; NCC Br. 22-23) that the statute requires the Secretary to weigh costs and benefits and to determine that there is a "reasonable relationship" between the two factors. Otherwise, they assert, a standard could drive an industry to the brink of ruin or result in a serious misallocation of limited resources under the Secretary's definition of "economically feasible" (AMTI Br. 31).

Petitioners' submission should be rejected for two reasons. As a factual matter, there is no evidence to indicate that the Secretary's administration of the Act, which has been carried out in a responsible and practical manner, will lead to such results. See pages 55-58, *infra.* More important, neither the language of the statute nor its legislative history contains any suggestion that Congress intended to impose upon the Secretary the duty to conduct a cost-benefit analysis in setting health standards for toxic substances.[42] Rather, the Secretary's statu-

---

[42] In some statutes, Congress has expressly determined that administrative agencies should perform a cost-benefit analysis in carrying out the legislative policy. On other occasions, Congress has not imposed such a requirement. See, *e.g., EPA* v. *National Crushed Stone Ass'n*, No. 79-770 (Dec. 2, 1980). The decision whether to require that regulations be cost-justified is clearly within the province of the legislative branch, and it is not the role of the courts to make that policy judgment anew. As the Court remarked in *TVA* v. *Hill*, 347 U.S. 153, 194 (1978): "Our individual appraisal of the wisdom or unwisdom of a particular course consciously selected by the Congress is to be put aside in the process of inter-

tory duty is clear: he must set standards that protect against significant risks of material harm to employee health, to the extent such protection is technologically and economically feasible.

To be sure, in determining the feasibility of a standard, the Secretary is obliged to consider the financial health and viability of an industry. But that is far different from requiring an individualized and heavily subjective balancing of costs and benefits in every case. A decision to engraft such a requirement upon this statutory scheme would not be consistent with either the legislative design or the proper function of the Court in construing this remedial legislation. See *Whirlpool Corp.* v. *Marshall*, 445 U.S. 1, 13 (1980).

In enacting the Occupational Safety and Health Act, Congress was not unaware of the need to give appropriate attention to practical considerations in enforcement of the statutory scheme. Congress therefore chose the term "feasible" to moderate the stringency of standards promulgated under the Act. Congress was likewise aware that costs and benefits would have to be balanced, and it struck the balance itself; it determined that a "reasonable relationship" exists when costs are feasible and their expenditure will reduce a significant risk of material health impairment. If the Secretary were required to make his own determination of a "reasonable relationship" between the cost and benefits of a particular standard, he would necessarily be empowered to strike the balance at a different and often less protective point than

---

preting a statute. Once the meaning of an enactment is discerned and its constitutionality determined, the judicial process comes to an end." See also *Benzene, supra*, slip op. 2 (Burger, C.J., concurring); *Harris* v. *McRae*, No. 79-1268 (June 30, 1980), slip op. 26. Whatever the intrinsic value of cost-benefit analysis, and we think petitioners grossly overstate both its practicability and its utility in this context, Congress neither explicitly nor implicitly required the Secretary to employ that technique in prescribing standards governing exposure to toxic substances in the workplace.

Congress intended.[43] Neither the language nor the legislative history of the Act countenances such a scheme.

A. A cost-benefit test is inconsistent with the language and legislative history of Section 6(b)(5)

1. The principal provision of the Act governing health standards for toxic substances, Section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5), is emphatic in its mandate: "The Secretary * * * shall set *the* standard which most adequately assures, to the extent feasible, * * * that *no* employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the [regulated toxic substance] for the period of his working life" (emphasis added). The language of Section 6(b)(5) contains no hint of a cost-benefit requirement. The role that the costs of a standard are intended to play is expressed in the phrase "to the extent feasible," and the ordinary meaning of "feasible" is "capable of being done." See *Webster's Third New International Dictionary* 831 (1976). The word does not refer to the desirability or benefit of doing something; it refers, instead, to the ability to do something.[44] Cost-

---

[43] A cost-benefit analysis would not always yield a less protective standard. If an industry's production process were extremely hazardous and its product readily replaceable, it might be that closing most or all of the industry would be cost-beneficial. But Congress clearly did not grant the Secretary the authority to regulate in that fashion. The courts have uniformly construed the feasibility limitation as prohibiting the Secretary from protecting workers by putting most of their employers out of business. *American Iron & Steel Institute* v. *OSHA*, 577 F.2d 825, 835 (3d Cir. 1978), cert. dismissed, No. 78-918 (Sept. 10, 1980); *AFL-CIO* v. *Brennan*, 530 F.2d 109, 123 (3d Cir. 1975); *Industrial Union Department* v. *Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974). The scheme that Congress directed the Secretary to follow—reduction of significant risks at feasible costs—is something quite different from that implied by conventional cost-benefit balancing tests.

[44] Congress has consistently employed the word "feasible" in health and safety legislation with this difference in mind, including in one statute enacted the same week as OSHA. Section 211(c)(2)

benefit analysis, on the other hand, involves a specific method for assessing the desirability of proposed actions.

In setting OSHA standards, the Secretary has first determined the level of protection at which employees will no longer face a significant risk of material harm; he has then determined whether that level is technologically and economically capable of achievement. If he finds that the level of protection is not technologically and economically feasible, the provisions of the standard

---

(A) and (B) of the Clean Air Act authorizes EPA to regulate, control or prohibit automobile fuel additives. Control or prohibition of additives that endanger the public health is permitted after the agency has considered "other technologically or economically *feasible* means of achieving emission standards * * *." In contrast, control or prohibition of additives that may impair effective operation of emission control devices is permitted only after consideration of *"a cost benefit analysis"* comparing device performance with and without the control or prohibition. 42 U.S.C. (Supp. III) 7545 (c)(2)(A) and (B) (emphasis added). See *Benzene, supra,* slip op. 23 n.27 (Marshall, J., dissenting) ("This approach demonstrates a legislative awareness of the difference between a feasibility constraint and a constraint based on weighing costs and benefits").

Later Congresses have also recognized this difference. For purposes of the 1977 effluent limitations established by the Federal Water Pollution Control Act Amendments of 1972, Congress required the "best practicable control technology currently available," which was to be determined by consideration of, *inter alia,* "the total cost of application of technology in relation to the effluent reduction benefits to be achieved" (33 U.S.C. 1311(b)(1)(A), 1314 (b)(1)(B)). With respect to the 1987 effluent limitations, however, Congress required the "best available technology economically achievable"; while "costs" were to be considered, no direct comparison of costs and benefits was required. See *EPA* v. *National Crushed Stone Ass'n, supra,* slip op. 5-6. And Section 325(a) of the Energy Policy and Conservation Act of 1975, 42 U.S.C. 6295, which requires the promulgation of energy conservation standards, specifies that a standard must be "economically justified." A standard was economically justifiable only if the Secretary found that the benefits of the standard outweighed its costs and that the standard was "economically feasible." "Feasibility" was defined as "capable of being carried out." S. Conf. Rep. No. 94-516, 94th Cong., 1st Sess. 172 (1975); H.R. Conf. Rep. No. 94-700, 94th Cong., 1st Sess. 172 (1975). But see 42 U.S.C. (Supp III) 6295.

must be adjusted. Requiring the Secretary to adjust the standard further through the cost-benefit technique that petitioners advocate would necessarily violate the "no-material-impairment" mandate of the statute by depriving employees of protection that is "feasible."

2. The cost-benefit gloss advocated by petitioners cannot be justified by resort to legislative history. That history unambiguously reflects Congress' determination that, in the case of toxic substances, affordable costs of reducing significant risks of material harm are categorically outweighed by the benefits derived from the prevention of premature death, disability, and disease. Congress' concern with the pernicious effects of exposure to toxic substances in the workplace was a primary impetus for passage of the Act. Leg. Hist. 142-143, 159-160, 411-415, 503, 510, 845-846, 1061. Congress condemned the continued unregulated presence in the workplace of the so-called "silent killers" [45] such as cotton dust, toxic substances whose harmful effects had been fairly documented; Congress was also concerned that those effects would be replicated geometrically due to the rapid introduction of new and yet untested chemicals and processes.[46]

---

[45] Leg. Hist. 1044-1045 (remarks of Rep. Udall).

[46] The Senate Committee on Labor and Public Welfare stated (Leg. Hist. 142-143):

> Occupational diseases which first commanded attention at the beginning of the Industrial Revolution are still undermining the health of workers. Substantial numbers, even today, fall victim to ancient industrial poisons such as lead and mercury. Workers in the dusty trades still contract various respiratory diseases. Other materials long in industrial use are only now being discovered to have toxic effects. In addition, technological advances and new processes in American industry have brought numerous new hazards to the workplace. * * * [N]ew materials and processes are being introduced into industry at a much faster rate than the present meager resources of occupational health can keep up with. It is estimated that every 20 minutes a new and potentially toxic chemical is introduced into industry. New processes and new

Congress recognized that the boldness of its legislation would have to match the seriousness of the problems presented. The Act would thus have to fill the "unconscionable gap between the minimal protection being given to [employees] and the protection they need" (Leg. Hist. 1045 (remarks of Rep. Udall)). Generally, the level of protection would have to be more stringent than that provided by the previously voluntary consensus standards.[47] With respect to toxic substances, Congress made clear that workers should remain healthy even if they spent their entire working lives in the industry. It was not acceptable to expect workers to be harmed, perhaps irreparably, and then move on to safer employment. As Senator Dominick remarked (Leg. Hist. 502-503; emphasis added):

> [W]hat we are doing now is to say that the Secretary has got to use his best efforts to promulgate the *best* available standards, and in so doing, that

---

sources of energy present occupational health problems of unprecedented complexity.

Recent scientific knowledge points to hitherto unsuspected cause-and-effect relationships between occupational exposures and many of the so-called chronic diseases—cancer, respiratory ailments, allergies, heart disease, and others.

* * * * *

Studies of particular industries provide specific emphasis regarding the magnitude of the problem. For example, despite repeated warnings over the years from other countries that their cotton workers suffered from lung disease, it is only within the past decade that we have recognized byssinosis as a distinct occupational disease among workers in American cotton mills.

See also *id.* at 844-846 (House Report).

[47] The House Report emphasized the minimalist character of national consensus standards (Leg. Hist. 848):

> Voluntary standards set by the consensus method represent the lowest common denominator of change in the status quo that is necessary to achieve acceptance. Now that we have chosen the force of law to command acceptance of safety and health regulations, this method should not apply.

> he should take into account that *anyone working in toxic agents or physical agents which might be harmful may be subjected to such conditions for the rest of his working life*, so that we can get at something which might not be toxic now, if he works in it a short time, but if he works in it the rest of his life it might be very dangerous; and we want to make sure that such things are taken into consideration in establishing standards * * *.

Congress was not unmindful that these requirements would entail substantial compliance costs. Senator Eagleton characterized these costs as "reasonable and necessary costs of doing business" (Leg. Hist. 1150) because "we can no longer permit profits to be dependent upon an unsafe or unhealthy worksite" (*id.* at 1151). Senator Yarborough, a principal sponsor of the legislation, echoed this understanding, stating that the cost of compliance was "the price we should pay for the 80 million workers of America" (*id.* at 444). Senator Yarborough also responded to the assertion by some critics that the costs of protection would be too great. He noted that the increased costs "would be put into consumer goods" (*id.* at 444), and further stated (*id.* at 510):

> One may well ask too expensive for whom? * * * Is it too expensive for the employee who loses his hand or leg or eyesight? Is it too expensive for the widow trying to raise her children on meager allowance under workmen's compensation and social security? * * *
>
> * * * * *
>
> We are talking about people's lives, not the indifference of some cost accountants. We are talking about assuring the men and women who work in our plants and factories that they will go home after a day's work with their bodies intact.

Congress anticipated that new standards could purchase greater protection only through greater costs, but it was not prepared to allow feasible standards to be

relaxed to accommodate particular employers. For instance, Congress recognized that small firms might face relatively greater economic burdens, but it refused to ease those burdens by lowering standards. Instead, Congress chose to assist such firms through government loans. Leg. Hist. 525-526; 15 U.S.C. 636(b)(5). See S. Rep. No. 93-132, 93d Cong., 1st Sess. 3 (1973). Moreover, Congress explicitly provided that temporary variances from a standard could not be based on economic hardship. 29 U.S.C. 655(b)(6)(A)-(B); Leg. Hist. 1188, 1201. Compare 29 U.S.C. 655(d). To guarantee the continued existence of every employer would permit employers who have lagged behind in safety and health protection to perpetuate their competitive advantage and frustrate the achievement of the legislative purpose.[48] See *EPA* v. *National Crushed Stone Ass'n*, *supra*, slip op. 14-18. Congress recognized that the standards to be imposed might significantly increase the cost of doing business, but it adjudged that the costs nonetheless should be imposed so long as they were feasible for the industry as a whole.

No Member of Congress so much as suggested that, because of cost-benefit considerations, the Secretary must tolerate risks of material health impairment, caused by toxic substances, when those risks could be eliminated feasibly. Given the length and thoroughness of the legislative inquiry prior to passage of the Act, the omission

---

[48] Congress found little natural economic incentive for employers to invest capital in safety and health protection. Because employees often move from job to job, "an employer investing in current occupational health precautions would receive no future benefits, not even in the reduction of workmen's compensation costs. He might be paying for the past neglect of another employer. Uniform enforcement will also reduce or eliminate the disadvantage that a conscientious employer might experience where inter-industry or intra-industry competition is present." Leg. Hist. 854 (House Report). Moreover, "many employers—particularly smaller ones—simply cannot make the necessary investment in health and safety, and survive competitively, unless all are compelled to do so." Leg. Hist. 144 (Senate Report).

of any reference to a matter as significant as a cost-benefit analysis "cannot be deemed inadvertent." *Benzene, supra,* slip op. 32 (Marshall, J., dissenting).

Petitioners support their contention that the statute requires a cost-benefit justification principally by reference to qualifying language contained in the Act: "most adequately" assures, "to the extent feasible," that no "material" impairment will occur (ATMI Br. 31-34). The Secretary does not dispute that this language mandates consideration of practical concerns, including costs, in the setting of standards. Neither Congress nor the Secretary has ever contended that this legislation does or should license the agency to attempt to achieve absolute occupational safety and health. But neither do these qualifying phrases insist upon a balancing of costs and benefits as the assurance that standards will be realistic.

A standard can "most adequately" assure protection when the benefits to be produced are significant and the costs are feasible. Furthermore, "material" impairment plainly refers to the severity of the health or safety consequences and to the degree of risk of suffering those consequences. *Benzene, supra,* slip op. 31-33 n.48. The concept of "material impairment" unquestionably limits the Secretary's standard-setting authority. Assessing the gravity and likelihood of adverse health consequences, however, does not logically entail a comparison of those consequences with the costs of avoiding them.[49] Hence, Congress' decision that "the" standard must protect against "material" impairment, rather than "any" impairment, does not suggest that avoidance of a "ma-

---

[49] For example, two substances may be equally likely to cause cancer. It may cost very little to minimize exposure to one, while it may be difficult and very costly to prevent exposure to the other. Contrary to petitioners' contention (ATMI Br. 38-40), it makes little sense to regard the potential impairment caused by unregulated exposure to one substance as more "material," or the risk of one as less "significant," than the other.

terial" impairment must be justified on a cost-benefit basis.[50]

3. The pattern and structure of the Act as a whole also demonstrate that Congress did not intend health protection in this area to depend on an individualized balancing of costs and benefits with respect to every standard. Congress' express purpose was to create safe and healthful workplaces "so far as possible" (Section 2 of the Act, 29 U.S.C. 651). The Act imposes on employers the general duty to furnish workplaces "which are free from recognized hazards that are causing or are likely to cause death or serious physical harm * * *" (Section 5(a)(1) of the Act, 29 U.S.C. 654(a)(1)). It

---

[50] The legislative history indicates that Congress substituted the term "material impairment" for "any impairment" to ensure that the Secretary would not be required to regulate trifling or remote hazards such as mosquito or black-fly bites. Leg. Hist. 345 (remarks of Sen. Dominick). Petitioners also rely (ATMI Br. 34) on the compromise reached by the conference committee, which resulted in the use of the "substantial evidence" scope of judicial review, rather than the "arbitrary and capricious" standard. See Section 6(f) of the Act, 29 U.S.C. 655(f). The substantial evidence standard reflects a legislative judgment that the Secretary should develop standards on a relatively formalized basis by providing a hearing and a record capable of review. Leg. Hist. 298-299, 884, 1053. But these procedural concerns do not show that Congress intended to protect industries from all costs that were not, in their view, "reasonably related" to benefits. *Florida Peach Growers Ass'n* v. *Department of Labor*, 489 F.2d 120 (5th Cir. 1974), cited by petitioners (ATMI Br. 34), suggests only that Congress was concerned about avoiding the imposition of "arbitrary burdens" on employers (489 F.2d at 128). The Fifth Circuit cites no legislative history to elucidate the manner in which a burden might be "arbitrary," and the sole reference relied on by ATMI here is totally inapposite. ATMI relies (ATMI Br. 34 n.70) on the remarks of Senator Cook with respect to the "arbitrary and capricious" test for judicial review. Leg. Hist. 342-344. But these remarks related to judicial review of the Secretary's veto of a state plan for regulating occupational health, not to judicial review of an occupational health standard or to the prospect that costs might be out of proportion to benefits. *Ibid.* Accordingly, this legislative compromise sheds no light on the issue whether a standard must satisfy a cost-benefit test.

is not enough that a workplace be "reasonably free" of hazards; it must be as free of serious hazards as possible. See *National Realty and Construction Co.* v. *OSHRC*, 489 F.2d 1257, 1265-1266 (D.C. Cir. 1973). Likewise, in choosing among alternative existing standards during the first two years after the Act became effective, the Secretary was required to "promulgate the standard which assures the greatest protection of the safety or health of the affected employees" (Section 6(a) of the Act, 29 U.S.C. 655(a)). Where a new standard deals with toxic substances, Section 6(b)(5) requires that the Secretary adopt "the" standard that "most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life" (29 U.S.C. 655(b)(5)). Finally, variances may be obtained, but only on limited grounds that do not include financial hardship. 29 U.S.C. 655(b)(6)(A)-(B), 655(f). Leg. Hist. 1188, 1201.

The statute thus was designed to ensure the highest possible degree of employee protection against significant risks of material harm, particularly in the case of toxic substances. The urgent call for highly protective standards to prevent significant risks of material impairment derived from a lifetime of exposure, the refusal to allow variances for economic hardship, and the provision of economic relief only through loans for small businesses, all show that Congress carefully considered and limited the role that cost considerations should play here, a role that does not include the lowering of feasible standards. There is no warrant to read into this statute "what Congress has studiously omitted." *FTC* v. *Simplicity Pattern Co.*, 360 U.S. 55, 67 (1959). See *Transamerica Mortgage Advisors, Inc.* v. *Lewis*, 444 U.S. 11, 20 (1979); *Great Atlantic & Pacific Tea Co.* v. *FTC*, 440 U.S. 69, 78-79 (1979).

Petitioners contend, however, that the Secretary's view of his mandate would push the industry to the brink of ruin (ATMI Br. 31). In our view, Congress' insertion of the feasibility requirement was specifically designed to preclude that draconian result and to assure that standards would be "reasonable" and "practical." We agree that the economic feasibility requirement limits the Secretary's authority to set standards for toxic substances. Moreover, were an economic feasibility test as ineffectual as the industry suggests, Section 6(b)(5) would be a harsh provision indeed. Consistent with the intent of Congress, however, the Secretary has construed the "capable of achievement" criterion in a reasonable and practical fashion that provides a meaningful brake on regulation.[51]

---

[51] Accordingly, petitioners' argument is not advanced even if, as they assert (ATMI Br. 32-33), Congress regarded the terms "reasonable" and "practical" as a gloss on "feasible," because the Secretary's application of the feasibility limitation results in reasonable and practical standards. Petitioners rely in the main on the remarks of Senator Javits, the original author of the feasibility amendment, to suggest that the term was meant to include something in the nature of "reasonableness" or "practicality." But petitioners' reading of the legislative history is deficient because Senator Javits did not use those words to describe his amendment. Senator Javits introduced the Nixon Administration's original bill (S. 2788, 91st Cong., 1st Sess. (1969)), which would have required the board responsible for issuing health and safety standards to submit its proposals to certain organizations for a report on "the technical feasibility, reasonableness and practicality of such standard." Leg. Hist. 38-39; 115 Cong. Rec. 22511 (1969). Contrary to ATMI's assertion, Senator Javits did not "describe" the report in terms of "reasonableness" and "practicality." The "description" of the report was made by President Nixon in his message concerning the Administration bill. See 115 Cong. Rec. 22511, 22517 (1969). Senator Javits specifically disassociated himself from the Administration's bill on a variety of issues, stating that "it may be desirable to go somewhat further than this bill does in strengthening the hand of the Federal Government in this area" (*id.* at 22512). Significantly, when Senator Javits actually described his feasibility amendment, he consistently used only the word "feasible"; he never equated "feasible" with "reasonable" or "practical"

As the court stated in *Industrial Union Department* v. *Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974), Congress did not "intend[] to protect employees by putting their employers out of business." The Secretary's overall purpose, therefore, is to assure that the industry is able to finance the costs of compliance, as well as other "reasonable and necessary costs of doing business" (Leg. Hist. 1150). At bottom, the Secretary must determine that the industry will maintain long-term profitability and competitiveness. Cf. *FPC* v. *Hope Natural Gas Co.*, 320 U.S. 591, 605 (1944). See also *United Steelworkers of America* v. *Marshall*, No. 79-1048 (D.C. Cir. Aug. 15, 1980), slip op. 144. It is against these benchmarks that the Secretary makes his economic feasibility determination, and he does in fact perform an extensive economic analysis involving a wide variety of factors in developing standards.

Thus, the Secretary's consideration of economic feasibility is far different from the industry's characterization, which implies that application of the feasibility test could result in nearly bankrupting an industry. As is evident from the Secretary's analysis of the impact of the cotton dust standard (see pages 14-22, *supra;* pages 63-65, *infra*), numerous economic factors were taken into account in making the determination of economic feasibility in this case. The Secretary closely examined the availability of capital to the industry, the extent to which cap-

---

(Leg. Hist. 197, 418). Furthermore, Senator Javits stated that the Senate Committee bill was "an improvement over * * * the Administration bill, which contains no criteria for standards at all (*id.* at 197)." Hence, rather than believing that he had incorporated criteria contained in the Administration bill, Senator Javits thought that that bill lacked any such criteria. Similarly, petitioners' reference (ATMI Br. 34-35) to congressional remarks on the need for a "balanced" bill is of little additional significance; Congress did indeed create a "balanced" bill. It balanced the economic consequences against the health of the nation's employees, but it did not authorize the agency to overturn that balance by means of a cost-benefit test.

ital was required for other purposes, the industry's profit history, the industry's ability to absorb costs or pass them on to the consumer, the impact of higher costs on demand, and the impact on competition with substitutes and imports.[52]

With the exception of the Fifth Circuit,[53] no court of appeals has held that the Secretary must perform a cost-benefit analysis in setting standards to regulate employee exposure to toxic substances in the workplace.[54] The issue was first considered by the District of Columbia Circuit in connection with the asbestos standard in *Industrial Union Department* v. *Hodgson, supra.* In that case, the court noted that the feasibility requirement mandates that the Secretary steer his course between the often opposing poles of preserving an industry's financial viability and declining to reinforce the competitive advantage of firms that have failed to expend resources on safety (499 F.2d at 478; footnote omitted):

> This qualification is not intended to provide a route by which recalcitrant employers or industries may avoid the reforms contemplated by the Act. Standards may be economically feasible even though, from the

---

[52] Where technologies are not fully developed, the analysis is necessarily more complicated. For example, in the lead standard, the agency listed six additional factors that may appropriately enter such determinations. 43 Fed. Reg. 54474-54476 (1978).

[53] See *American Petroleum Institute* v. *OSHA*, 581 F.2d 493 (5th Cir. 1978), aff'd on other grounds, *Industrial Union Department* v. *American Petroleum Institute*, No. 78-911 (July 2, 1980). Accord, *Texas Independent Ginners Ass'n* v. *Marshall*, 630 F.2d 398, 412-413 (5th Cir. 1980).

[54] Petitioners apparently do not contest the accuracy of this statement (see ATMI Br. 41), but suggest that some significance should be attributed to the fact that other courts have not "considered explicitly the nature of the economic impact assessment that is required * * * to comply with Section 3(8) as well as Section 6(b)(5) of the Act" (*ibid.*). Whatever weight should be given to Section 3(8), it should not be assumed that the courts were unaware of that section. Petitioners' argument also rests on two cases that are inapposite here. See page 51, note 56, *infra*.

> standpoint of employers, they are financially burdensome and affect profit margins adversely. Nor does the concept of economic feasibility necessarily guarantee the continued existence of individual employers. It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers.

Accord, *AFL-CIO* v. *Brennan*, 530 F.2d 109, 123 (3d Cir. 1975); *American Iron and Steel Institute* v. *OSHA*, 577 F.2d 825, 836 (3d Cir. 1978), cert. dismissed, No. 78-918 (Sept. 10, 1980). See *Society of Plastics Industry, Inc.* v. *OSHA*, 509 F.2d 1301 (2d Cir.), cert. denied, 421 U.S. 992 (1975).[55] This test for economic feasibility is both reasonable and fully consistent with the congressional intent to provide the greatest protection possible against significant risks of material harm.[56]

---

[55] This test has also been approved in other safety and health contexts. The 1972 amendments to the Federal Water Pollution Control Act, for example, provide that 1983 effluent limitations should be based on "the best available technology economically achievable" (33 U.S.C. 1311(b)(2)(A)). The courts have held that a standard is "economically achievable" even if it is costly and may close some marginal plants, so long as the costs may reasonably be borne by the industry as a whole. See *American Iron and Steel Institute* v. *EPA*, 526 F.2d 1027, 1051-1052 (3d Cir. 1975); *CPC Int'l, Inc.* v. *Train*, 540 F.2d 1329, 1341-1342, 1344 (8th Cir. 1976); *American Frozen Food Institute* v. *Train*, 539 F.2d 107, 119-120, 139-140 (D.C. Cir. 1976). Moreover, contrary to ATMI's suggestion (ATMI Br. 44 n.88), the 1983 limitations were not to be set on a cost-benefit basis. See *EPA* v. *National Crushed Stone Ass'n*, No. 79-770 (Dec. 2, 1980), slip op. 5-6.

[56] Petitioners rely (ATMI Br. 42) on two cases construing the word "feasible" in the OSHA noise standard (29 C.F.R. 1910.95(b)(1)), which requires that employers utilize "feasible administrative or engineering controls" to reduce employee exposure to noise. See *Turner Co., Div. of Olin Corp.* v. *Secretary of Labor*, 561 F.2d 82 (7th Cir. 1977); *RMI Co.* v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979). In *Turner*, however, the court premised its decision

B. The requirement of Section 3(8) that a standard be "reasonably necessary or appropriate" does not embody a cost-benefit test

There is no merit to petitioners' additional contention (ATMI Br. 36-38) that a cost-benefit test may be in-

---

on the fact that the noise standard had originally been promulgated under the Walsh-Healey Act, 41 U.S.C. 35 *et seq.*, which contained no requirement that standards be feasible, and that it was subsequently adopted as a national consensus standard under 29 U.S.C. 655(a) also without consideration of feasibility (561 F.2d at 85), The Seventh Circuit reasoned that fairness required that a cost-benefit analysis be applied in enforcing the standard in these circumstances (*ibid.*). We disagree. At most, this calls for interpreting "feasibility" to include consideration of cost—not to require a balancing of costs and benefits. Second, the court of appeals relied on its determination that noise appeared to be far less significant than other hazards that pose "serious debilitating threats" or are "life-threatening." *Id.* at 86. It was only "[i]n this perspective" that the court required the Secretary to weigh costs and benefits before regulating noise levels. In *RMI*, the Sixth Circuit followed *Turner*. The present context is significantly different because the cotton dust standard aims at a serious, debilitating and life-threatening hazard and was developed after full consideration of feasibility.

For similar reasons, ATMI's reliance (ATMI Br. 44-45) on the decisions of the Occupational Safety and Health Review Commission is misplaced. The Secretary, not the Commission, is the official entrusted by Congress with the responsibility to study occupational health and safety hazards and to set remedial standards. The Commission has neither the authority nor the expertise to investigate occupational health hazards or to decide how best to regulate them. The Commission's function is to adjudicate alleged violations of the standards that the Secretary has set. Compare Section 6(b) of the Act, 29 U.S.C. 655(b), with Section 10 of the Act, 29 U.S.C. 659. Indeed, Congress rejected the proposal to delegate standard setting power to an independent commission (see Leg. Hist. 148, 462, 1186-1187, 1191, 1192, 1201-1202), and the Commission's construction cannot bind the Secretary. Cf. *Marshall* v. *Sun Petroleum Products Co.*, 622 F.2d 1176, 1180-1183, 1186-1188 (3d Cir.), cert. denied, No. 80-471 (Dec. 15, 1980). In any event, the most recent pronouncement of the Commission shows that its three members hold widely differing views concerning the meaning of the term "feasible." *Samson Paper Bag Co.*, 3 Empl. Safety & Health Guide (CCH) ¶ 24,555 (June 16, 1980).

ferred from the statute's definition of a health standard. Section 3(8) of the Act, 29 U.S.C. 652(8), provides that a standard must be "reasonably necessary or appropriate to provide safe or healthful employment." This phrase means only that the regulation must be aimed at reducing significant risks of material harm (see *Benzene*, *supra*, slip op. 35), must adhere to the criteria laid down elsewhere in the statute, and must be rationally related to the legislative goals in passing the Act.

The statute must be construed as a harmonious whole. As we have shown above (see pages 39-47, *supra*), the requirement of a cost-benefit anaylsis is not reconcilable with Section 6(b)(5) of the Act, the principal provision relating to standards for toxic substances. Moreover, the legislative history contains nothing to warrant the conclusion that Section 3(8), in contrast to Section 6(b)(5), was intended to incorporate a requirement that costs and benefits be weighed. Indeed, while Section 6(b)(5) was the subject of vigorous debate prior to passage of the Act, Section 3(8) received virtually no comment.[57] There is no basis, therefore, for clothing Section 3(8) with a substantive requirement so inconsistent with that supplied in Section 6(b)(5). To do so would " 'impute to Congress a purpose to paralyze with one hand what it sought to promote with the other.' " *Weinberger* v. *Hynson, Westcott & Dunning*, 412 U.S. 609, 631 (1973), quoting *Clark* v. *Uebersee Finanz-Korp*, 332 U.S. 480, 489 (1947).

Nor does the plurality opinion in *Benzene* suggest a contrary conclusion. While the plurality held that Section 3(8) requires a threshold finding of a significant risk of harm, the plurality also found that threshold to be implied in Section 6(b)(5)'s reference to "toxic" sub-

[57] All but one of the original bills contained a definition of "occupational safety and health standard" that was either similar or identical to that eventually enacted. Leg. Hist. 3, 35, 78, 532, 601, 631, 683, 725, 768, 937. The legislative history appears to contain no reference to these provisions, however, except in the section-by-section analyses of the committee reports.

stances, "harmful" physical agents, and "material" impairment. Moreover, the plurality relied on general comments in the legislative history concerning the conceded impossibility of eliminating all risks. *Benzene*, *supra*, slip op. 31-33, 36-38. In contrast, petitioners' cost-benefit test is not consistent with the statute's "no material impairment" provision, either on its face or in light of the legislative history.

Petitioners' reliance (ATMI Br. 43) on other statutes containing language similar to "reasonably necessary or appropriate," and judicial interpretations of such language, is also misplaced because significant differences exist in the language, legislative histories and regulatory purposes of those statutes. The Consumer Product Safety Act (CPSA), for example, requires that, as a predicate to finding that a particular "rule * * * is reasonably necessary to eliminate or reduce an unreasonable risk of injury," the Consumer Product Safety Commission (CPSC) must determine "the need of the public for the consumer products subject to such rule, and the probable effect of such rule upon the utility, cost, or availability of such products to meet such need." 15 U.S.C. 2058(c)(1)(C), (c)(2)(A).[58] That language, specifically requiring that costs be justified by benefits, is not found in either the text or the legislative history of the Occupational Safety and Health Act.[59] A further critical distinction between

---

[58] The legislative history of the CPSA expressly indicates the congressional intent that standards would be determined by balancing these considerations: "It is generally expected that the determination of unreasonable hazard will involve the Commission in balancing the probability that risk will result in harm and the gravity of such harm against the effect on the product's utility, cost, and availability." H.R. Rep. No. 92-1153, 92d Cong., 2d Sess. 33 (1972). See S. Rep. No. 92-749, 92d Cong., 2d Sess. 7 (1972).

[59] The regulatory purposes of the National Traffic and Motor Vehicle Safety Act, 15 U.S.C. 1381 *et seq.*, on which petitioners rely (ATMI Br. 44 n.88), are similarly distinguishable. For example, the vehicle safety standard reviewed in *H&H Tire Co.* v. *Department of Transportation*, 471 F.2d 350 (7th Cir. 1972), was designed to make retreaded tires safer, but the costs thus created threatened to make retreads unavailable to those consumers who

the two statutes must also be noted: the risks and benefits of a consumer product accrue to the same party, the consumer, who can choose to avoid the risk. Employees, on the other hand, rarely have such a choice—they must bear the risk of occupational health hazards, while benefits accrue largely to employers and consumers. Although the Secretary's authority is limited to eliminating "significant" risks, it does not follow that this limitation has the same content as the "unreasonable" risk limitation placed on the CPSC.

C. A cost-benefit test is not necessary to prevent serious economic disruptions or serious misallocation of scarce resources for combating occupational disease

The recurring theme of petitioners' argument is that only the imposition of a cost-benefit requirement can prevent a serious misallocation of societal resources. Even if there were a realistic possibility that the statute might

---

would supposedly benefit from the standard. *Id.* at 355. In light of Congress' unambiguously stated intent that retreads were to remain available, the likely result of the regulation could not be "appropriate" within the meaning of 15 U.S.C. 1392(f)(3). *Ibid.* Moreover, the legislative history of that statute indicates that the agency was to consider not only feasibility, but also "reasonableness of cost." S. Rep. No. 1301, 89th Cong., 2d Sess. 6 (1966).

Petitioners also rely (ATMI Br. 45) on the Environmental Protection Agency's decision to consider the cost of further reducing risks posed by airborne carcinogens in determining whether a national emission standard provides an "ample margin of safety." 44 Fed. Reg. 58642, 58661 (1979); 42 U.S.C. (Supp. III) 7412(b)(1)(B). In discussing this decision (44 Fed. Reg. 58660-58661 (1979)), EPA noted that the elimination of all risks posed by air pollutants was impossible and concluded that Congress could not have intended this requirement to force the closing of major industries. The Secretary, of course, pursues the same policy in setting OSHA standards. The critical distinction, however, is that Congress, in Section 6(b)(5) of the Act, gave guidance to the Secretary with respect to how he should weigh the economic consequences of regulation. That guidance is less obvious in EPA's "ample margin of safety" requirement. Once EPA had determined that its statutory discretion permitted the consideration of costs, it was perhaps appropriate for the agency to engage in balancing risks against costs. No such discretion exists here.

result in a misallocation of resources, it would provide no basis for the courts to overrule the policy judgments of Congress. See page 37, note 42, *supra*. In any event, the Secretary's construction and administration of the statute has not resulted in the misapplication of resources and does not threaten to put industries to the brink of ruin (see pages 48-51, *supra*). The regulatory process guards against such misallocations in numerous ways.

First, Section 6(g) of the Act, 29 U.S.C. 655(g), provides that, "[i]n determining the priority for establishing standards under this section, the Secretary shall give due regard to the urgency of the need for mandatory safety and health standards for particular industries, trades, crafts, occupations, businesses, workplaces or work environments." To the extent possible, therefore, in determining where the need for prompt rulemaking is the greatest, the Secretary assesses relative risks, costs, and benefits. The Secretary's obligation to address hazards in the order of their severity provides substantial assurance that resources will be applied in a rational manner. See 45 Fed. Reg. 5284-5285 (1980).

Second, the Secretary may regulate only *significant* risks of *material* harm. See *Benzene*, *supra*, slip op. 29. That limitation likewise assures that resources will be devoted to eliminating or reducing only substantial threats to employee health. Third, the statute permits the Secretary to select the least expensive means of compliance that will provide an adequate level of protection.[60] That general principle is underscored by the variance provision of the Act, which permits employers to use alternative compliance methods that are as "safe and

---

[60] Of course, the Secretary may not choose a less costly standard that does not provide the level of protection required by the statute. In the case of the cotton dust standard, the Secretary rejected the industry's alternative on that ground. By contrast, the Secretary found in the lead standard rulemaking proceedings that engineering and non-engineering controls provided equally effective compliance methods. Thus, the lead standard permits employers to achieve the PEL through either, or a combination, of these methods. 43 Fed. Reg. 52990 (1978).

healthful" as those provided by the general standard. Section 6(d) of the Act, 29 U.S.C. 655(d).

Fourth, a standard aimed at reducing exposure to one harmful substance frequently will also protect against many other harmful substances because engineering controls generally remove all air contaminants.[61] Fifth, limitations of technological feasibility will often limit expenditures of financial resources because, as here (see pages 12-14, *supra*), it will often be impossible to achieve the degree of stringency that is actually warranted by the health data. Sixth, the standard must be financially affordable, a requirement that obligates the Secretary to consider the costs of the standard in light of the industry's overall financial condition and competing needs for capital, including the need to protect against more serious health hazards.[62]

Seventh, the Secretary gives additional consideration to financial costs in determining the period of time that should be allowed for compliance. In the present case, for instance, the Secretary allowed the industry four years in which to institute engineering controls; in the lead standard, the Secretary provided for periods ranging from five to ten years. See 43 Fed. Reg. 52983-52984, 53008 (1978). Finally, the Secretary's enforcement policy takes account of financial hardship on an individualized basis. The Industrial Hygiene Field Operations Manual, U.S. Department of Labor, Occupational Safety and Health Administration (1980), provides that, based on an employer's economic situation, the Secretary

---

[61] For instance, compliance with the lead standard by primary lead smelters will achieve substantial compliance with the arsenic standard. See 43 Fed. Reg. 54354, 54494 (1978). Likewise, engineering controls required by the coke oven emissions standard will also reduce benzene levels. 43 Fed. Reg. 5937, 5944-5945, 5948 (1978).

[62] The textile industry objected to the cotton dust standard by pointing to OSHA's proposal for more stringent controls on workplace noise levels as a potentially competing need for capital (J.A. 258-261). The Secretary pressed forward with the present standard, however, because of his judgment that byssinosis is a more urgent health problem in this industry.

may extend the period within which a violation must be corrected.[63] Compare *United Steelworkers of America* v. *Marshall*, No. 79-1048 (D.C. Cir. Aug. 15, 1980), slip op. 161-163.

One need look no further than the present case for an apt illustration of the reasonableness and practicality of the Secretary's regulatory approach. Although the RTI study suggested that the 200 ug/m^3 PEL would not drive the industry to the brink of bankruptcy, RTI also determined that the cost impact of the proposed level would be severe in the weaving sector, because it might require the physical reconstruction of 90% of all weave rooms. The Secretary therefore concluded that the 200 ug/m^3 level was not feasible for weaving and that the 750 ug/m^3 level was all that could reasonably be required.

It is obvious from the foregoing discussion that the Secretary's approach to regulation in this area bears little resemblance to the version portrayed by petitioners,[64] and it is not likely to result in a serious misallocation of resources. Indeed, the Secretary's administration of the statute, when viewed in its entirety, shows that the Secretary takes into account cost implications to the fullest extent permitted by the Act. At bottom, petitioners' quarrel is with the fact that the statute does

---

[63] The manual provides (ch. 1, § I(4)(b)):

> The employer's economic cost of correction is generally not considered to be a factor in the issuance of a citation.
>
> (1) However, if the cost of implementing effective engineering, administrative or work practice controls, or combination, would so seriously jeopardize the employer's financial condition so as to result in the probable shutdown of the establishment or a substantial part of it, an extended correction date may be set.

[64] Nor must the Secretary's interpretation of Section 6(b)(5) be abandoned on the hypothetical ground that he might someday promulgate a standard the costs of which would be entirely disproportionate to the benefits. "[T]o put an extreme case is not a good test of the fair and just interpretation of any statute." *United States* v. *Dickson*, 40 U.S. (15 Pet.) 141, 164 (1841) (Story, J.).

not go so far as they would like: it does not authorize a cost-benefit analysis in the standard-setting determination.

For their part, petitioners would engraft upon the statute a balancing test that would require the Secretary to determine whether the benefits of a standard bear a "reasonable relationship" to its costs. Apparently in recognition of the fundamental problems with that approach, petitioners quickly add that they do not mean to suggest any need for a "rigidly formal cost-benefit calculation that places a dollar value on employee lives or health" (ATMI Br. 39.). But there is no other way to perform a meaningful cost-benefit analysis.[65] Unless there was agreement as to the dollar value of the benefits to be gained, any determination that costs and benefits are "reasonably related" would be arbitrary.[66] Hence, placing a value on human life and freedom from suffering is an indispensable part of petitioners' program.

At all events, any attempt to employ cost-benefit analysis in this area would have to overcome a number of serious obstacles. As just noted, if costs and benefits are to be compared, they must be computed in the same

---

[65] A "formal" cost-benefit analysis may be characterized as one that seeks to weigh the costs and benefits of a particular course of action by computing and comparing the net present values of both the costs and the benefits. As applied to the setting of occupational health standards, the benefits of improved health would have to be valued in monetary terms and then compared with the costs associated with the regulation.

In any event, petitioners' assertion (ATMI Br. 39) that a cost-benefit analysis would not "predetermine the decisions that OSHA must make" is disingenuous at best. Under petitioners' theory, the results of such an analysis would necessarily dictate the ultimate determination. If the results showed that costs were not "reasonably related" to benefits, the standard would have to be adjusted. Otherwise, the exercise is pointless.

[66] We do not mean by this that analyses of the costs and benefits of achieving a given level of regulatory stringency are useless or should be avoided in contexts where they are warranted. In some contexts, they provide valuable information, and their use has been encouraged by the President. Exec. Order No. 12044, 43 Fed. Reg. 12661, 12663 (1978).

units, which means that benefits must be assigned a dollar value. Even the assessment of the dollar costs of avoiding lost wages and medical expenses, which are already valued quantitatively, would be a prodigious undertaking. To be accurate, these calculations would require comprehensive data on the affected workforce, including age and earnings profiles, medical histories, postretirement experience, and premature death tables. Cost information concerning an employer's increased workers' compensation and medical insurance premiums, direct health care costs, and indirect productivity losses resulting from excess absenteeism, worker turnover, and other related inefficiencies also would have to be taken into account. See 41 Fed. Reg. 46751 (1976); 45 Fed. Reg. 5248 (1980). Even if reliable data were available for an entire industry, which is unlikely, there remain the insurmountable problems of placing a wholesale economic value on the pain, suffering, and premature deaths that will be visited upon the workforce of an industry, which is necessarily composed of persons with widely different characteristics and circumstances.[67]

---

[67] Pain and suffering attendant to group illness and injury are not easily reducible to monetary terms. 41 Fed. Reg. 46751 (1976); 45 Fed. Reg. 5248 (1980). There is no generally accepted method for valuing such considerations, even implicitly. See Senate Comm. on Governmental Affairs, 95th Cong., 2d Sess., Study on Federal Regulation, Vol. VI, at XXIV (Comm. Print 1978). Attempts have been made, however, to attach a value to life itself for this type of analysis. One such approach, the "human capital" approach, calculates the value of an individual life by computing the present value of future income as a measure of the individual's contribution to the national economy. Because this valuation system depends on earning levels, it leads to lower values on the lives of retired workers, women, and other low wage groups such as textile workers. This calculation also necessarily assumes that there is no other value to human life than producing income to maximize the gross national product. Another type of valuation has attempted to analyze wage rates for high risk jobs and to utilize the so-called "risk premium" paid for such jobs as a measure of a life. This analysis necessarily, and probably incorrectly, assumes that employees have the freedom to move to lower-risk jobs and that they have adequate knowledge to make a well-informed choice. It was for these reasons that the

Moreover, there would have to be general agreement whether a stream of health benefits and saved lives extending into the future should be ignored, discounted to present value, or otherwise calculated. A cost-benefit analysis of the cotton dust standard, for example, would surely have to consider more than the current employees in the industry. The permanent technological health improvements required by the standard would benefit untold millions of future employees as well. See *Benzene, supra*, slip op. 15 n.22 (Marshall, J., dissenting).

Another defect in traditional cost-benefit analysis is that it cannot account for those considerations of equity that underlay the very concept of occupational health regulation. While the cost-benefit technique has gained some adherents as an allegedly value-free method for dealing with all manner of difficult questions, this technique originated in the context of investment capital decisions, where costs and benefits not only were already expressed in dollars, but also accrued to the same party. In occupational health regulation, however, employees bear the risk of occupational disease, while consumers and employers may acquire some benefit if the risk is not curbed. See 45 Fed. Reg. 5249 (1980). The unequal distribution of costs and benefits in this context necessarily raises the question of this statute's purpose and its determination of what is equitable; the mere calculation of costs and benefits cannot supply that answer.[68]

Secretary concluded that there was no adequate methodology to quantify the value of a life. 41 Fed. Reg. 46751 (1976); 45 Fed. Reg. 5248 (1980). These problems are necessarily compounded, of course, when the calculations purport to give some economic value to large numbers of lives. See generally Note, *Cost-Benefit Analysis for Standards Regulating Toxic Substances Under the Occupational Safety and Health Act:* American Petroleum Institute v. OSHA, 60 B.U.L. Rev. 115 (1980).

[68] In addition to the problems inherent in attributing a dollar value to benefits, a cost-benefit analysis depends for its accuracy on the quality of available information concerning the extent of the risk. While the agency had the benefit of the comprehensive dose-response curve derived from Dr. Merchant's data in the case of cotton dust, this may well be the exception rather than the rule. Quantitative risk assessments typically yield only crude and inexact

Clearly, petitioners' technique for determining the appropriate stringency of a standard is not the panacea that they claim it to be. As the court of appeals concluded (Pet. App. 76-77; footnotes omitted):

> [C]ost-benefit analysis would not necessarily improve agency health and safety determinations. These techniques require the expression of costs, benefits and performance in often arbitrary, measureable terms. They may hide assumptions and qualifications in the seeming objectivity of numerical estimates. Especially where a policy aims to protect the health and lives of thousands of people, the difficulties in comparing widely dispersed benefits with more concentrated and calculable costs may overwhelm the advantages of such analysis.

The Secretary assessed the benefits of the cotton dust standard, which he found to be "appreciable," and he found the costs to be both economically and technologically feasible. Thus, the test established by Congress was satisfied. Petitioners' alternative would assure no better result.

In light of this conclusion, it follows that Section 6 (b) (5), as construed and applied by the Secretary, does not constitute an impermissible delegation of legislative power. Cases such as *A.L.A. Schechter Poultry Corp.* v. *United States*, 295 U.S. 495 (1935), and *Panama Refining Co.* v. *Ryan*, 293 U.S. 388 (1935), are inapposite because the Secretary has not been given broad, uncanalized authority to restructure the entire economy. On the contrary, the statute directs the Secretary to

---

numerical indicators of risk because large numbers of uncertainties are involved. Although there may be substantial evidence of risk as a qualitative matter, numerical figures assigned to different exposures could well be erroneous by several orders of magnitude. Thus, a great degree of uncertainty would be implicit in any cost-benefit calculation in this context. On the cost side, moreover, the agency's experience with the vinyl chloride regulation shows that predictions of anticipated expenses may be grossly inflated when compared to actual expenses. See Doniger, *Federal Regulation of Vinyl Chloride: A Short Course in the Law and Policy of Toxic Substances Control*, 7 Ecol. L.Q. 497 (1978).

carry out the legislative mandate for a safe and healthful workplace but not "to protect employees by putting their employers out of business * * * by making financial viability generally impossible." *Industrial Union Department* v. *Hodgson*, *supra*, 499 F.2d at 478. OSHA, like other regulatory bodies, is empowered to order changes in the way that business is conducted, but that authority is not the roving commission that petitioners suggest; it is an authority to enforce the terms of a specific statute, which the Secretary has done in a manner that avoids unreasonable results and serious misallocations of resources.

Although the Secretary's authority in the area of occupational health and safety is admittedly far reaching, it is no greater than Congress thought necessary to combat a serious and complex—but precise—national problem, whose manifestations exist in extraordinary variety. The statutory language provides an adequate and intelligible standard to guide the Secretary in fulfilling these responsibilities. And in administering the statute, the Secretary must follow a procedure that requires the making of a record so that Congress, the courts, and the public may determine whether the statutory criteria have been faithfully observed. See *Opp Cotton Mills, Inc.* v. *Administrator*, 312 U.S. 126, 144 (1941); *Benzene*, *supra*, slip op. 2 (Burger, C.J., concurring).

III. THE SECRETARY CORRECTLY CONCLUDED THAT THE COTTON DUST STANDARD IS ECONOMICALLY FEASIBLE

Petitioners' attack on the feasibility limitation as an illusory and meaningless restraint on the agency's authority rests in large part on their faulting of the Secretary's economic feasibility analysis in this case. However, these essentially factual arguments were rejected by the court of appeals, which concluded that substantial evidence supported the Secretary's determination that the cotton dust standard would not threaten the industry's position as a viable, competitive economic entity (Pet. App. 61-69). Although petitioner National Cotton Council asks this Court to reconsider whether substan-

tial evidence supports the Secretary's determination of economic feasibility, it has not met its burden of showing that the substantial evidence test was "misapprehended or grossly misapplied" by the court of appeals. *Golden State Bottling Co.* v. *NLRB*, 414 U.S. 168, 172 (1973), quoting *Universal Camera Corp.* v. *NLRB*, 340 U.S. 474, 491 (1951).

Petitioners do not dispute that the Secretary had voluminous information for his consideration in determining economic feasibility. Rather, they essentially contend that he had to accept either the whole of the industry submission or the whole of the RTI study. That contention is plainly insubstantial because the Secretary cannot be expected to accept cost estimates uncritically and without independent analysis. As we have shown (see pages 14-19, *supra*), the Secretary properly concluded that both studies were flawed in particular respects and that, while neither overall cost estimate was dispositive in itself, the two studies together provided sufficient data to permit the Secretary to make a reasoned determination as to the expense that the final standard would require.[69] After taking a hard look at the assumptions underlying the two cost estimates,[70] the Secretary ap-

---

[69] In the court of appeals' words, the agency "tried to account for the divergence between the estimates from these two sources by exploring the assumptions each employed. After examination, the agency decided that both sets of estimates are overstatements, and chose to rely on what it regarded the best portions of each estimate" (Pet. App. 62; footnotes omitted).

[70] As we have noted (page 19, *supra*), the Secretary was somewhat handicapped because of the industry's refusal to provide supporting data. Although ATMI eventually supplied its survey data, that information merely identified existing air quantities, filtration systems, and types of fiber processed. Because the number of machines was deleted and correlated dust data were not supplied, the data could not be used to support a specific cost adjustment. Moreover, this submission did not include any of Hocutt's own data (J.A. 388-397; App. 3490-3560).

National Cotton Council's suggestion that the rationale for utilizing the industry estimate was constructed *post hoc* by agency counsel is specious. The Secretary explicitly concluded that the industry estimates were "more realistic" (43 Fed. Reg. 27373 (1978)), explicitly rejected the technological assumptions that underlay the

plied his expertise and concluded that the costs estimated by the industry would cover the likely costs of compliance with the final standard.[71] The court of appeals correctly sustained that choice as a reasonable approach to assessing the likely economic impact in these circumstances (Pet. App. 62-66).

Having found that the industry's overall cost estimate best reflected the probable compliance costs of the final standard, the Secretary then considered the question whether those costs were feasible. RTI had exhaustively analyzed the probable impact on the industry of various compliance cost levels, and the Secretary critically examined the RTI studies. As we have shown (see pages 19-22, *supra*), the Secretary concluded that those studies were reliable and that the compliance costs he had projected were therefore feasible.

IV. THE MEDICAL TRANSFER AND INCOME PROTECTION PROVISION IS WITHIN THE SECRETARY'S AUTHORITY TO IMPOSE REQUIREMENTS REASONABLY NECESSARY AND APPROPRIATE TO SECURE HEALTHFUL EMPLOYMENT

The textile petitioners contend (ATMI Br. 51-56) that the Secretary exceeded his authority by including

---

industry's cost estimate and led the industry to view 500 ug/m^3 as an impenetrable barrier (*id.* at 27366-27367) and, in the case of weaving, explictly stated that he was adopting the industry estimate on the ground that the final standard would not require costly engineering controls and air requirements as estimated by RTI (*id.* at 27371).

[71] There is no merit to petitioners' suggestion (ATMI Br. 25 n.51; NCC Br. 10) that RTI's estimates, based on prices in effect in 1974, should be adjusted to reflect equipment price increases since that time. First, the Secretary adopted the industry's estimates, which were based on 1977 prices. Second, and more important, it must be assumed that the real cost of such equipment has not changed in that industry revenues as well as equipment prices have increased due to inflation. Similarly, the projected productivity loss caused by the standard's restriction on "blow-down" cleaning cannot be regarded as a significant cost, as National Cotton Council contends (NCC Br. 10-11), because the Secretary reasonably concluded that "blow-down" cleaning would necessarily become infrequent once the standard is implemented (43 Fed. Reg. 27389 (1978)).

a medical transfer and income protection provision in the cotton dust standard. This provision (29 C.F.R. 1910.1043(f)(2)(v)) specifies that when a physician determines that an employee is unable to wear a respirator, the employee must be given an opportunity to transfer, without loss of earnings or employment rights, to another position, *if one is available*, in which the dust level is at or below the permissible exposure limit. The court of appeals correctly held (Pet. App. 95-98) that the transfer and income protection provision is within the Secretary's statutory authority to impose "practices, means, methods, operations, or processes" that are "reasonably necessary or appropriate to provide safe or healthful employment." Section 3(8) of the Act, 29 U.S.C. 652(8).

The Secretary determined that it will take several years to implement the engineering controls required by the cotton dust standard and that employees should be equipped with respirators during the interim to avoid breathing air contaminated beyond the designated levels. The Secretary also determined, however, that some employees are physically unable to wear respirators due to facial structure, severe discomfort, or impaired breathing capacity (43 Fed. Reg. 27387 (1978)). The need for transfers in such a situation is obvious: if transfers are not available, employees who cannot wear respirators would be exposed to dust concentrations in excess of the PEL and would be exposed to a significant risk of material health impairment. The medical transfer provision therefore is an integral and necessary part of the statutory obligation of all employers to reduce cotton dust exposure for all employees.[72]

---

[72] Petitioners contend (ATMI Br. 54) that construing the Act to authorize the Secretary to impose this requirement would also allow the Secretary to impose obligations for other programs, such as employer-sponsored food stamp programs and health spa retreats, that are arguably health related. Unlike petitioners' far-fetched hypotheticals, however, the medical transfer requirement is not merely "arguably related" to employee health. Rather, the transfer

If an employee is transferred to a lower paying job because his employer cannot otherwise comply with its statutory duty to provide a healthful workplace, the employee should not be required to suffer economic hardship. If that result occurred, the cost of protection would be placed on the employee, rather than on the employer, as Congress intended. See Leg. Hist. 144, 444, 854, 1150-1151. Furthermore, as the Secretary concluded, the record showed that, without a provision for income protection, the success of the respirator program would be impaired (43 Fed. Reg. 27387 (1978)). Experience under the Act has shown that employees are reluctant to disclose symptoms of disease and tend to minimize work-related health problems for fear of being discharged or transferred to a lower paying job (J.A. 210-212, 213-216, 218-220, 323-324, 436). It may reasonably be expected, therefore, that many employees incapable of using respirators would continue to breathe unhealthful air rather than request a transfer, thus destroying the utility of the respirator program. Hence, the transfer requirement could not be effective without a guarantee that no employee would suffer a related loss in earnings. Thus, the Secretary determined to include such a guarantee in the transfer requirement during the interim period in which an employer had not yet achieved the permissible exposure

---

provision is a specific requirement aimed at reducing employees' exposure to a toxic substance; the requirement is narrowly based and directly related to the purpose of the remaining provisions of the cotton dust standard—to minimize detrimental health consequences as a result of exposure to cotton dust. Petitioners err in suggesting that the Secretary must wait for an employee to develop some material health impairment before he can provide for that employee's transfer. As this Court recently remarked in reviewing the purposes of the Act, "the legislation's remedial orientation is prophylactic in nature. * * * The Act does not wait for an employee to die or become injured. It authorizes the promulgation of health and safety standards * * * in the hope that these will act to prevent deaths or injuries from ever occurring." *Whirlpool Corp.* v. *Marshall*, 445 U.S. 1, 12 (1980).

limit through the implementation of engineering controls (43 Fed. Reg. 27387 (1978)).[73]

The statute provides ample authority for the Secretary's imposition of the transfer and income protection requirement. See *United Steelworkers of America* v. *Marshall*, No. 79-1048 (D.C. Cir. Aug. 15, 1980), slip op. 66-74. The dominant purpose of the Act is to "assure so far as possible every working man and woman in the Nation safe and healthful working conditions" (Section 2 of the Act, 29 U.S.C. 651). Congress explicitly recognized that that purpose would be achieved only "by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems" (Section 2(b)(5) of the Act, 29 U.S.C. 651(b)(5)). Section 6(b)(5) requires the agency to "set *the* standard which *most adequately* assures * * * that *no* employee will suffer material impairment of health or functional capacity * * *" (29 U.S.C. 655(b)(5) (emphasis added)), and Section 3(8) provides that a standard may require "conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment * * *." 29 U.S.C. 652(8). The medical transfer and income protection provision clearly satisfies these statutory requirements and directly advances the purpose of the Act. Although the statute does not expressly refer to transfers, "when it is remembered that safety legislation is to be liberally construed to effectuate the congressional purpose" (*Whirlpool Corp.* v. *Marshall, supra*, 445 U.S. at 13), the provision is well within the Secretary's broad statutory authority.[74]

---

[73] As the court of appeals noted (Pet. App. 98), this provision is not open-ended. Once employers achieve the required reduction in dust levels, respirators will not be required for the vast majority of employees. The provision is therefore "a reasonable incentive * * * to speed compliance efforts" (*ibid.*).

[74] Petitioners attempt to show (ATMI Br. 56) that the Secretary lacks authority to require transfers by pointing out that Congress itself specifically provided for transfers and income protection in the Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C.

Contrary to ATMI's contention (ATMI Br. 55), the challenged provision does not conflict with the Court's recent construction of the Act in *Whirlpool*. The congressional concern with the so-called "strike-with-pay" regulation discussed in *Whirlpool* centered on avoiding endless disputes over compensating employees for *not* working. See Leg. Hist. 416. The Court noted in *Whirlpool* that "what primarily troubled Congress about the * * * 'strike-with-pay' provision was its requirement that employees be paid their regular salary after having properly invoked their right to refuse to work * * * When it rejected the 'strike-with-pay' concept, * * * Congress very clearly meant to reject a law unconditionally imposing upon employers an obligation to continue to pay their employees their regular pay checks when they absented themselves from work for reasons of safety." 445 U.S. at 17-19. See *United Steelworkers of America* v. *Marshall, supra*, slip op. 73-75 n.69.

843(b)(2), (3), and the Clean Air Act Amendments of 1977, 42 U.S.C. (Supp. III) 7410(a)(6). But the fact that Congress, based on its study of the problems in a particular area, chose to make such a provision explicit in the statute governing that area hardly indicates that Congress intended to preclude an administrator from making a similar determination under a separate, more general health protection statute. As Senator Saxbe stated during the legislative consideration of the Act (Leg. Hist. 297-298):

> Neither bill contains, as one might reasonably imagine, a list of specific "do's and don'ts" for keeping workplaces safe and healthful. Industrial safety and health problems are as complex and changing as American industry itself. They cannot be solved by a lengthy list of prohibitions spelled out in a statute.
>
> Instead, the bills would set up a legal structure; that is, they would empower an administrative agency to issue detailed safety and health regulations, called standards, which will have the force and effect of law. * * *

See also *United Steelworkers of America* v. *Marshall, supra*, slip op. 66-74. If any inference is to be drawn from Congress' inclusion of a transfer and income provision in other statutes, it is that the Secretary's action here is fully in accord with legislative policy with respect to appropriate preventive occupational health requirements. See *Whirlpool Corp.* v. *Marshall, supra*, 445 U.S. at 13 n.18.

The transfer provision at issue here stands in sharp contrast. Rather than enabling an employee to refuse to do any work and still be paid, this provision only requires a transfer to do other work, and then only if that work is available. The transfer provision does not require employers to pay workers who have "absented themselves from work for reasons of safety." *Whirlpool Corp.* v. *Marshall, supra,* 445 U.S. at 19. Furthermore, the transfer provision may not be invoked by an employee unilaterally. The transfer is conditioned both upon a physician's determination that an employee cannot wear a respirator and upon the availability of another job. In sum, the concerns of Congress as expressed in the legislative history of the Act and as discerned by this Court in *Whirlpool* are not at odds with this reasonable, limited means of protecting employee health.

CONCLUSION

The judgment of the court of appeals should be affirmed.

Respectfully submitted.

WADE H. MCCREE, JR.
Solicitor General

CARIN A. CLAUSS
Solicitor of Labor

KENNETH S. GELLER
Deputy Solicitor General

BENJAMIN W. MINTZ
Associate Solicitor

BARRY SULLIVAN
Assistant to the Solicitor General

ALLEN H. FELDMAN
DENNIS K. KADE
DIANE E. BURKLEY
JOHN A. BRYSON
Attorneys
Department of Labor

DECEMBER 1980

☆ U. S. GOVERNMENT PRINTING OFFICE: 1981 335729 231

Nos. 79-1429 and 79-1583

JAN 30 1981

MICHAEL RODAK, JR. CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.,

Respondents.

NATIONAL COTTON COUNCIL OF AMERICA,

Petitioner,

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.,

Respondents.

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF FOR UNION RESPONDENTS

J. ALBERT WOLL
General Counsel, AFL-CIO
815 15th Street, N.W.
Washington, D.C. 20005

ELLIOT BREDHOFF
General Counsel
Industrial Union Department, AFL-CIO
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036

ARTHUR M. GOLDBERG
General Counsel
Amalgamated Clothing & Textile Workers Union
15 Union Square
New York, New York 10003

Of Counsel

GEORGE H. COHEN
(Counsel of Record)
ROBERT M. WEINBERG
JEREMIAH A. COLLINS
BREDHOFF, GOTTESMAN, COHEN, CHANIN, WEINBERG & PETRAMALO
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 833-9340

LAURENCE GOLD
815 16th Street, N.W.
Washington, D.C. 20006

Attorneys for American Federation of Labor and Congress of Industrial Organizations, Industrial Union Department, AFL-CIO, and Amalgamated Clothing & Textile Workers Union, AFL-CIO

WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

Nos. 79-1429 and 79-1583

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.,

Respondents.

NATIONAL COTTON COUNCIL OF AMERICA,

Petitioner,

v.

RAY MARSHALL, SECRETARY OF LABOR, ET AL.,

Respondents.

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF FOR UNION RESPONDENTS

COUNTERSTATEMENT OF THE QUESTIONS PRESENTED

1. Whether a health standard satisfies the requirements of the Occupational Safety and Health Act when the Secretary has properly determined (a) that the standard substantially reduces a significant risk to worker health, (b) that the standard is the one that "most ade-

quately assures" worker protection, and (c) that the standard is "feasible."

2. Whether the Occupational Safety and Health Act authorizes the Secretary to require earnings protection for workers whose only available safeguard against exposure to excessive levels of a harmful physical agent is transfer to jobs in low exposure areas.

TABLE OF CONTENTS

	Page
COUNTERSTATEMENT OF THE QUESTIONS PRESENTED	i
TABLE OF AUTHORITIES	v
STATUTORY PROVISIONS INVOLVED	1
STATEMENT OF THE CASE	1
I. Health Effects	2
A. The Chronic Disease	2
B. The Acute Disease	4
C. The Dose-Response Relationship	6
II. The Standard	10
III. The Technological Feasibility of the Standard	14
IV. The Costs of the Standard	14
SUMMARY OF ARGUMENT	19
ARGUMENT	23
I. THE SECRETARY IN SETTING THE COTTON DUST EXPOSURE LIMITS CARRIED OUT THE MANDATE OF §§ 3(8) AND 6(b)(5) OF OSHA	23
A. The Governing Statutory Principles	23
B. The Statutory Principles Applied	40
II. THE ACT AUTHORIZES THE SECRETARY TO REQUIRE EARNINGS PROTECTION FOR WORKERS WHO MUST BE TRANSFERRED TO AVOID EXCESS EXPOSURE TO COTTON DUST	51
CONCLUSION	55

TABLE OF CONTENTS—Continued

		Page
APPENDIX A:	Text of Statutory Provisions Involved	1a
APPENDIX B:	A Survey of Statutory Approaches to the Consideration of Costs and Benefits in the Promulgation of Health and Safety Regulations	1b

TABLE OF AUTHORITIES

Cases: Page

Environmental Defense Fund v. *EPA*, 548 F.2d 998 (D.C. Cir. 1976) 5b

EPA v. *National Crushed Stone Assn.* (No. 79-770; Dec. 2, 1980) 22, 24, 51, 2b

Forester v. *CPSC*, 559 F.2d 774 (D.C. Cir. 1977) .. 4b

Industrial Union Depart. v. *American Petrol. Inst.*, —— U.S. —— (Nos. 78-911 & 78-1036; July 2, 1980) 19, 20, 23, 27

Industrial Union Department v. *Hodgson*, 499 F.2d 467 (D.C. Cir. 1974) 53

TVA v. *Hill*, 437 U.S. 153 (1978) 39

United States v. *General Motors Corp.*, 518 F.2d 420 (D.C. Cir. 1975) 3b

United States v. *Rutherford*, 442 U.S. 544 (1979) .. 5b

Weyerhaeuser Corp. v. *Costle*, 590 F.2d 1011 (D.C. Cir. 1978) 2b

Whirlpool Corp. v. *Marshall*, 445 U.S. 1 (1980) .. 49, 53, 54

Statutes and Regulations:

Child Protection and Toy Safety Act of 1969, as amended, 15 U.S.C. § 1261 *et seq.* 4b

§ 1261(s) 4b

Clean Air Act Amendments of 1970, as amended, 42 U.S.C. § 7401 *et seq.* 3b

§ 7545(c)(2)(A) 3b

§ 7545(c)(2)(B) 3b

Clean Water Act Amendments of 1977, 33 U.S.C. § 1251 *et seq.* 2b, 3b

§ 1314(b)(4)(B) 3b

Consumer Product Safety Act of 1972, 15 U.S.C. § 2051 *et seq.* 4b

§ 2056(a) 4b

§ 2058(c)(1)(A) 4b

§ 2058(c)(1)(C) 4b

§ 2058(c)(2)(A) 4b

TABLE OF AUTHORITIES—Continued

	Page
Energy Policy and Conservation Act of 1975, as amended, 42 U.S.C. § 6201 *et seq.*	1b
§ 6295(c)	1b
§ 6295(d)	1b
Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C. § 801 *et seq.*	53
§ 801-878	53
§ 801-960	53
§ 842(b)	53
§ 842(e)	53
§ 843(b)	53
§ 863	53
Federal Environmental Pesticide Control Act of 1972, as amended, 7 U.S.C. § 136 *et seq.*	4b
§ 136(bb)	4b
§ 136a(c)(5)(C)	5b
§ 136a(c)(5)(D)	5b
§ 136a(c)(7)	5b
§ 136a(c)(8)	5b
§ 136a(d)	5b
§ 136d(b)	5b
Federal Food, Drug, and Cosmetic Act of 1938, 21 U.S.C. § 301 *et seq.*	5b
§ 321(p)(1)	5b
§ 346	5b
§ 346a	5b
§ 348(c)(4)(A)	5b
§ 348(c)(4)(B)	5b
§ 360b	5b
Federal Water Pollution Control Act Amendments of 1972, as amended, 33 U.S.C. § 1251 *et seq.*	1b
§ 1311(b)(1)	2b
§ 1311(b)(2)(A)	2b
§ 1312(b)(1)	2b
§ 1312(b)(2)	3b
§ 1314(b)(1)(B)	2b

TABLE OF AUTHORITIES—Continued

	Page
Flood Control Act of 1936, 33 U.S.C. § 701 *et seq.*...	1b
§ 701(a)	1b
National Traffic and Motor Vehicle Safety Act of 1966, as amended, 15 U.S.C. § 1381, *et seq.*.....	3b
§ 1391(1)	3b
Occupational Safety and Health Act of 1970, 29 U.S.C. § 651 *et seq.*	*passim*
§2(b), 29 U.S.C. § 651(b)	25
§ 3(8), 29 U.S.C. § 652(8)	*passim*
§ 6(a), 29 U.S.C. § 655(a)	8, 25
§ 6(b)(5), 29 U.S.C. § 655(b)(5)	*passim*
§ 6(b)(6)(A), 29 U.S.C. § 655(b)(6)(A).....	35
§ 6(b)(7), 29 U.S.C. § 655(b)(7)	23, 52, 54
§ 6(b)(8), 29 U.S.C. § 655(b)(8)	25
§ 28, amending 15 U.S.C. § 636(b)(5)	21, 38
The Outer Continental Shelf Lands Act Amendments of 1978, 43 U.S.C. § 1331 *et seq.*	1b
§ 1347(b)	1b
Small Business Act, 15 U.S.C. § 633, *et seq.*	22
§ 636(b)(5)	22
Toxic Substances Control Act of 1976, 15 U.S.C. § 2601 *et seq.*	5b
§ 2605(a)	5b
§ 2605(c)(1)	5b
Walsh-Healy Act, 41 U.S.C. § 35 *et seq.*	8
§ 35(e)	8
Code of Federal Regulations	
29 C.F.R. § 1910.1043(d)	13
29 C.F.R. § 1910.1043(f)(1)	51
29 C.F.R. § 1910.1043(f)(1)(i)	12
29 C.F.R. § 1910.1043(f)(1)(ii)	13
29 C.F.R. § 1910.1043(f)(1)(iii)	13
29 C.F.R. § 1910.1043(f)(1)(iv)	13

TABLE OF AUTHORITIES—Continued

Page

29 C.F.R. § 1910.1043(f)(1)(v) 13
29 C.F.R. § 1910.1043(f)(2)(v) 13, 51
29 C.F.R. § 1910.1043(h) 13
29 C.F.R. § 1910.1043(i) 13
29 C.F.R. § 1910.1043(j) 13
29 C.F.R. § 1910.1043(k) 13
29 C.F.R. § 1910.4 2

Legislative Materials:

Senate Subcomm. on Labor, Comm. on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970 (Comm. Print 1971) ..... *passim*
Senate Report No. 89-1301, 89th Cong., 2d Sess. (1966) 4b
Senate Report No. 91-237, 91st Cong., 1st Sess. (1969) 4b
Senate Report No. 91-1282, 91st Cong., 2d Sess. (1970) 30, 31, 38, 40, 41
Senate Report No. 92-749, 92d Cong., 2d Sess. (1972) 4b
House Report No. 91-1765, 91st Cong., 2d Sess. (1970) 35
House Report No. 91-2191, 91st Cong., 2d Sess. (1970) 29
House Report No. 92-1153, 92d Cong., 2d Sess. (1972) 4b

Miscellaneous:

House Comm. on Interstate and Foreign Commerce, Subcomm. on Oversight and Investigations, *Federal Regulation and Regulatory Reform*, 95th Cong., 1st Sess. 515 (1976) 40
Decision of the Commissioner in the Matter of Diethylstilbestrol: Withdrawal of Approval of New Animal Drug Applications, 44 Fed. Reg. 54852 (Sept. 21, 1979) 5b

STATUTORY PROVISIONS INVOLVED

In addition to the sections of the Occupational Safety and Health Act of 1970, P.L. 91-596, 84 Stat. 1590, 29 U.S.C. § 651 *et seq.*, which are set forth in the Appendix to the Brief for Petitioners American Textile Manufacturers Institute, Inc., et al., other pertinent provisions of that Act are set forth in Appendix A to this brief.

STATEMENT OF THE CASE

More than 200,000 workers in the American textile industry inhale cotton dust throughout their regular working day.[1] As a result, thousands of these employees

---

[1] The textile industry has two basic sectors: (a) the manufacture of yarn and (b) the weaving of yarn into cloth. Approximately 200,000 workers are exposed to cotton dust in yarn manufacturing. 43 Fed. Reg. 27379, col. 2. A substantial additional number is exposed in the weaving sector. See Ex. 6, No. 76 at III-5 (Joint Appendix filed in this Court (hereinafter "App.") at 78).

The Secretary of Labor described the process of yarn manufacturing as follows:

> Cotton lint arrives at the textile mill in hydraulically compressed packaged bales. At the mill the bale covering is removed and the contents are passed through the *opening* machinery which exposes it to successive processes of intense decompression, beating, cleaning, and mixing. During these operations, dirt and other heavy impurities are removed by gravity or by centrifugal force through grids or screens. Cotton from the opening equipment is usually conveyed pneumatically to the *picker* room where it is fed evenly to the pickers which further open and clean the cotton and deliver either a picker lap, a flat thick batt of randomly oriented fibers, or pneumatically conveyed loose cotton lint to the carding machinery. *Carding* machines comb the fiber so that it lies straight and parallel and some cleaning is also effected. . . . The main processes in a spinning mill after carding are: *drawing* to obtain thorough fiber mixing and weight uniformity, *roving* to draw the sliver down to one-fourth to one-eighth its original size and slightly twist it, and *spinning* to give considerable fine draft to the soft roving and twist it into yarn. [Yarn manufacturing p]rocesses subsequent to spinning [i.e., *winding*, *spooling*, *twisting* and *warping*], are only amalgamation of yarn

suffer from chronic and acute respiratory diseases. The occupational health standard under review here is designed to reduce the incidence of these diseases by controlling employee exposure to cotton dust.

I. Health Effects

A. *The Chronic Disease*

Textile workers are permanently disabled by chronic obstructive pulmonary disease at more than three times the rate of comparable populations not exposed to cotton dust. In the statement of reasons accompanying the standard, the Secretary of Labor [2] concluded that by "conservative" estimate, approximately 35,000 present or former textile workers are currently permanently disabled by that disease (commonly known as "brown lung"). 43 Fed. Reg. 27353, col. 3; see also A. Bouhuys, et al., *Epidemiology of Chronic Lung Disease in a Cotton Mill Community*, Ex. 124 at 14 (App. 347).

Chronic obstructive pulmonary disease—which includes Grade 3 byssinosis, chronic bronchitis and emphysema—constitutes "the final clinical stage of cotton dust induced respiratory disease" and is irreversible. 43 Fed. Reg. 27353, col. 1. That disease is characterized by a

---

units or changes in the form of the package and result in the production of a yarn in a form suitable for dispatch to the fabric manufacturing mill.

43 Fed. Reg. 27365, cols. 1-2 (emphasis added). See also *id.* at 27365-67.

Weaving operations consist of slashing and weaving. In "slashing" sizing is added to the yarn to strengthen it for weaving. Weaving is the process of interlacing two sets of yarn, one running lengthwise on a loom, the other crosswise, by means of a shuttle, to produce a woven fabric which is ready for finishing processes such as dyeing.

[2] The authority of the Secretary of Labor to promulgate occupational safety and health standards under the Act has been delegated to the Assistant Secretary for Occupational Safety and Health. 29 C.F.R. § 1910.4. Hereinafter the term "Secretary" shall refer jointly to the Secretary and the Assistant Secretary.

debilitating permanent narrowing of the bronchial tubes or airways of the lungs. 41 Fed. Reg. 56500, col. 3:[3]

> In human terms, the affected worker frequently loses the ability to function normally on or off the job. . . . [T]he respiratory disease contracted in the textile mills typically result[s] in premature retirement often after futile and painful attempts to continue on the job. [43 Fed. Reg. 27352-27353.]

The record contains extensive worker testimony documenting that point. The following examples are illustrative:

> My mother had to leave the mill in [her] early fifties. Before she left, her breathing got so short she just couldn't hold out to work. My step-father left the mill on account of breathing problems. He had coughing spells til he couldn't breath[e], like a child's whooping cough. Both my sisters who work in the mill have breathing problems. My husband had to give up his job when he was only fifty-four years old because of the breathing problem.
>
> I had to retire at age fifty with a breathing problem that has since been diagnosed as byssinosis caused by breathing cotton dust. [Tr. 2094-2095 (App. 451-452) (testimony of Mrs. Norton).]

> Every time that I [would] go into the mill I [would] get deathly sick, choking and vomiting[,] losing my breath. . . .
>
> I am only fifty-seven years old and I am retired and I can't even go to church because of my breathing. I get short of breath just walking around the house or dressing or sometimes just watching T.V.

---

[3] The reference is to the preamble to the proposed standard. In the statement of reasons accompanying the final standard the Secretary incorporated by reference "the basic conclusions advanced in the proposed regulations" regarding the health effects of cotton dust. 43 Fed. Reg. 27352, col. 2.

> I cough all the time. [Tr. 2096 (App. 452) (testimony of Mrs. McCoy).][4]

"Total disability and even death may follow." 41 Fed. Reg. 56500, col. 3; see also *id.* at 56501, cols. 1-2.

B. *The Acute Disease*

The process that produces chronic obstructive pulmonary disease in workers exposed to cotton dust generally commences with acute respiratory ailments and loss of lung function. 43 Fed. Reg. 27352, cols. 2-3, 27354, col. 2. The acute stages of that disease process have been classified as byssinosis grades ½, 1, and 2.[5] There is no orderly progression from one grade of the disease to the next. As Dr. Russell Harley, an American Textile Manufacturers Institute (ATMI) witness, testified:

> [T]he assumption is often made that the disorder progresses from ½ to 1 to 2 to 3 and, thus, all grades reflect the progress of the individual's disability. In many instances, however, there is no progression at all. Sometimes Grade 3 seems to ap-

---

[4] See also Tr. 2107 (App. 453) (testimony of Louis Harrell):

> I got a slip from my doctor in Duke saying I had to get out of the dust if I were to survive. I gave it to [the company] and that seemed not to make any difference. They just didn't come across with anything so I had to quit because I couldn't lay down and rest without oxygen in the night. . . . [When] I walked across to the mill [,] I couldn't even breathe, I had to get out of the door so I could breathe and [my doctor] told me not to go back in there under any circumstances. So that is how I came to leave.

See also, *e.g.*, Tr. 2152-2154 (App. 456-457); Tr. 2187-2188 (App. 457-458).

[5] The commonly used Schilling system classifies the acute stages of byssinosis as follows (41 Fed. Reg. 56500, col. 3):

> Grade ½—occasional chest tightness on the first day of the work week.
>
> Grade 1 —chest tightness and/or breathlessness regularly occurring on the first day of the work week.
>
> Grade 2 —chest tightness and/or breathlessness throughout the week.

> pear *de novo* or there is a jump from 1 to 3. Among those who develop permanent disability, Grade 2 very often never occurs. [Ex. 41 at 3 (App. 192).]

As the Secretary found, "the rate at which a worker progresses to [the chronic] stage, if at all, depends upon . . . the susceptibility of the individual." 43 Fed. Reg. 27352, col. 3.[6]

Looking at the adverse health effects in each of the acute stages of the disease, the Secretary found that these effects are "significant . . . in themselves and should be prevented in so far as possible." *Id.* at 27354, col. 2. These effects include shortness of breath, chest tightening, coughing and wheezing, and fatigue.[7] They are typically first experienced by a worker upon re-entering the mill at the beginning of a work week; thereafter, with continuing exposure, the effects become progressively more frequent and more severe. *Id.* at 27352, col. 2, 27354, cols. 2-3. Beginning at Grade ½, the physical distress suffered by workers with byssinosis reflects a significant loss of lung function, which loss is measurable by objective techniques.[8] At the higher grades

---

[6] The Secretary found that at the acute stages of byssinosis, the symptoms of the disease "apparently" may be reversed over time by eliminating further exposure of the affected employee to cotton dust. 43 Fed. Reg. 27354, col. 2. But a reversal of symptoms does not necessarily mean that all damage has been repaired; upon a return to exposure it is likely that an employee's "ability to combat the disease is less than when [he was] normal to begin with." Tr. 839-841 (App. 421-425) (Dr. El Batawi).

[7] In addition, beginning at Grade ½, acute byssinosis is accompanied by an increased prevalence of bronchitis. 43 Fed. Reg. 27354, col. 2.

[8] 43 Fed. Reg. 27352, cols. 2-3, 27354, col. 2. The most widely used measurement of pulmonary function is "forced expiratory volume in one second" (FEV_1), i.e., the volume of air which an individual is able to expel from his lungs in one second by blowing hard into a measuring device called a spirometer. See A. Bouhuys, *Byssinosis in the United States*, Ex. 6-16 at 14-15 (App. 17-18). As a group, workers with byssinosis, including those in grade ½,

of acute byssinosis, the physical distress[9] and the measurable loss of lung function increase; by Grade 2, breathlessness and fatigue are frequently such that a worker must seek a change of job. See J. Merchant, et al., *Dose Response Studies in Cotton Textile Workers*, Ex. 6-51 at 8 (App. 48); see also pp. 9-10, *infra*.

C. *The Dose-Response Relationship*

The Secretary concluded that:

> [T]he work by [Dr. James] Merchant et al . . . represents the most thorough and objective evaluation of byssinosis prevalence in the United States textile industry. . . . [43 Fed. Reg. 27355, col. 3.][10]

---

exhibit lower FEV_1 values (i.e., less ability to breathe out forcefully) than other workers. 43 Fed. Reg. 27354, col. 2.

[9] As Dr. Arend Bouhuys, Director of the Yale University Lung Research Center and "a preeminent authority on pulmonary function" (43 Fed. Reg. 27353, col. 2), explained:

> I think it is important to stress that I and others who have done similar studies have seen these workers at the end of the work shift, have noticed their labored breathing . . . so, there is no doubt in my mind that there is a serious health hazard here judging from these acute effects" [Tr. 168 (App. 401-402).]

Those observations were confirmed by Dr. Jeffrey Taylor, Associate Director of the Appalachian Laboratory for Occupational Safety and Health (operated by the National Institute for Occupational Safety and Health (NIOSH), the research agency created by the Act within the Department of Health and Human Services, 29 U.S.C. § 671). Dr. Taylor stated that the symptoms of acute byssinosis tend "to become worse during the working day. And in the evening [the affected worker] finds it difficult to undergo normal activities, he finds it difficult to walk rapidly home, and tends to do very little." Tr. 1025 (App. 434-435).

[10] Dr. Merchant is presently the Director of the Appalachian Laboratory for Occupational Safety and Health (see note 9, *supra*), and has been engaged in research regarding the respiratory diseases of textile workers since 1968. Tr. 1000-1001 (App. 423-424). His studies of the prevalence of respiratory ailments in the textile industry comprise some 15 papers, which have been part of the scientific literature since the early 1970's. 43 Fed. Reg. 27355, col. 3.

And, the Secretary found, "the dose-response data of Merchant [et al.], supported by numerous other studies [in the record] . . . , is the best available. . . ." *Id.* at 27358, col. 2.[11]

The Merchant study found a "striking dose-response relationship[]," *ibid.*, "between the prevalence of byssinosis and the concentration of lint-free respirable dust as measured by a vertical elutriator."[12] *Id.* at 27353, col. 3. The Secretary concluded that this dose-response relationship provides a proper basis to assess the extent of the health risks presented by different levels of exposure to cotton dust. *Id.* at 27358, col. 2 - 27360, col. 3.

The most extensive of these papers is nearly 350 pages long. See J. Merchant, *Epidemiological Studies of Respiratory Disease Among Cotton Textile Workers*, Ex. 38d.

[11] The Secretary noted that Merchant's study had been "published and subject to peer review for several years without any major reported challenges to its basic soundness." 43 Fed. Reg. 27357, col. 3. At the hearing the only witness to question the validity of Merchant's methodology was Dr. Moon Suh, a Burlington Industries statistician. After reviewing Suh's criticisms, the Secretary found the rebuttal offered by Dr. Merchant and others "convincing[ ]." *Ibid.* "Contrary to Dr. Suh's view, an evaluation of the methodology of this massive survey of thousands of textile workers shows the Merchant study to have been based on sound statistical ground." *Ibid.*; see generally *id.* at 27357-27358.

At the hearing, ATMI submitted several surveys conducted under the auspices of ATMI and certain of its member companies. These ATMI surveys purported to find lower prevalences of byssinosis than the Merchant study found. None of these surveys approached the Merchant study in rigor, thoroughness, and extent of documentation. The Secretary addressed these industry surveys in detail, 43 Fed. Reg. 27355-27357, and concluded that they cast no doubt on the findings of the Merchant study.

[12] The vertical elutriator is a device which measures the airborne concentration of lint-free respirable cotton dust—i.e., dust particles of 15 microns or less in size. *Id.* at 27355, col. 2. Measurements of the concentration of "elutriated dust" (which are expressed in terms of weight-per-volume) correspond most closely with the observed health effects of exposure to cotton dust. *Ibid.* Unless otherwise specified, hereinafter all references to exposure levels shall be to concentrations of elutriated dust.

The Merchant study found that 26% of workers in *yarn manufacturing* operations [13] in the cotton textile industry would contract some form of acute byssinosis if exposed at a concentration of 500 ug/m^3 of elutriated cotton dust—an exposure level equivalent to that permitted by the then-current federal government standard [14] and the level that petitioner ATMI proposes should be continued as the standard. 43 Fed. Reg. 27355, col. 3.[15] The study further found that the prevalence of byssinosis among those workers is reduced to 13% when the exposure level is reduced to 200 ug/m^3—the level that

---

[13] Yarn manufacturing includes all operations in the cotton textile manufacturing process except the weaving operations. See note 1, *supra*.

[14] At the time of the rulemaking the exposure limit for all operations was 1000 ug/m^3 of "total dust." See 43 Fed. Reg. 27351, col. 1. In yarn manufacturing operations, this is roughly equivalent to 500 mg/m^3 of elutriated dust. 41 Fed. Reg. 56504, col. 3; see also note 12, *supra*. The 1000 ug/m^3 total dust standard was first adopted in 1968 by the Secretary pursuant to the Walsh-Healy Act, 41 U.S.C. § 35(e), to apply to government contractors. In 1971 that PEL was adopted by the Secretary, without notice and comment, as an OSHA standard pursuant to § 6(a) of the Act, 29 U.S.C. § 655(a), which required as an interim measure the prompt adoption, without rulemaking procedures, of "established Federal standard[s]." The 1000 ug/m^3 total dust standard was originally selected as a Walsh-Healy standard because it had been recommended as a "Threshold Limit Value" (TLV) by the American Conference of Governmental Industrial Hygienists (ACGIH). 43 Fed. Reg. 27351, col. 1. In 1974, however, the ACGIH revised its TLV for cotton dust, adopting a limit of 200 ug/m^3 of elutriated dust. *Ibid.*

[15] The Merchant study measured the prevalence of byssinosis observed at a particular time, in relation to the dust levels present at that time. ATMI asserts that the study is therefore flawed because "exposure levels in the past [in the plants studied] . . . [were] presumably higher." ATMI Br. at 9. But Merchant testified that to avoid just that problem he selected for his study mills at which production processes and machinery, as well as dust control equipment, had not been changed significantly in recent years, and at which the dust levels should have been the same as in the past. Tr. 1042 (App. 438).

the Secretary ultimately adopted as the maximum permissible level. And, the prevalence of such disease is reduced still further to 7% when the level is reduced to 100 ug/m^3—the level that respondent unions urged the Secretary to adopt. *Ibid.*

With respect to *weaving* operations,[16] the study found that the rate of byssinosis is 5% at the exposure level then permitted by the government, 1000 ug/m^3 "*total* dust".[17] *Ibid.* The rate of byssinosis among affected employees rises to 10% when the exposure level in the weaving operation is raised to 750 ug/m^3 "elutriated dust"—the level that the Secretary ultimately permitted. *Id.* at 27360, col. 3.[18]

The Merchant study also broke down the data on prevalence rates by grade of byssinosis. This breakdown shows that the prevalence of grade 2 byssinosis for yarn manufacturing operations is 8% at an exposure level of 500 ug/m^3, as compared to 3% at an exposure level of 200 ug/m^3. Ex. 6-51, Tables 2 and 6 (group 5) (App. 31, 44).

The authors of the study emphasized that this data underestimated the prevalence rates of grade 2 byssinosis and of chronic obstructive pulmonary disease:

> [Workers] with tightness on Monday and other days (Grade 2) frequently also complain of dyspnea and fatigue; as a result it is not uncommon to find that these workers request a change in job location.

---

[16] See note 1, *supra.*

[17] See note 14, *supra.*

[18] The dust in weaving rooms is composed primarily of sizing materials, usually starch or polyvinyl alcohol, rather than cotton. *Id.* at 27360, col. 2. This explains why dust in weaving operations results in a lower prevalence of byssinosis than the same concentration of dust in yarn manufacturing operations. *Ibid.* The Secretary determined that the previous 1000 ug/m^3 *total* dust standard was "more stringent" than the 750 ug/m^3 *elutriated* dust standard which the Secretary adopted in the instant standard for weaving operations. *Id.* at 27381, col. 1.

> Therefore, those with Grade 2 byssinosis symptoms are likely to represent a highly selected group which would very likely result in an underestimation of risk. *Id.* at 7-8 (App. 48).[19]

Further, studies of only *active* workers cannot measure the prevalence of chronic obstructive pulmonary disease, because, as the Secretary found, this "disease contracted in the textile mills typically result[s] in premature retirement often after futile and painful attempts to continue on the job." 43 Fed. Reg. 27352, col. 3 - 27353, col. 1; see also pp. 3-4, *supra*. However, the study of Dr. Bouhuys, which included *former* as well as active cotton textile workers, enabled the Secretary to assess the prevalence of chronic obstructive pulmonary disease among cotton textile workers:

> Although some estimates of the prevalence of chronic disease have been presented in various studies, the Bouhuys estimate constitutes the only evaluation of chronic health effects for the entire active and retired textile worker population. [*Id.* at 27353, col. 3-27354, col. 1.]

Bouhuys estimated, as mentioned, that these workers suffer disablement from chronic respiratory diseases at three times the rate of comparable populations not exposed to cotton dust and that "approximately 35,000 employed and retired textile workers are currently disabled" by such diseases. *Id.* at 27353, col. 3.[20]

II. The Standard

After reviewing the massive rulemaking record before him, the Secretary fashioned a standard designed to decrease the prevalence of respiratory disease among cot-

---

[19] See also Ex. 6-1 at 8 (App. 14) (Drs. Roach and Schilling); Ex. 124 at 11 (App. 344) (Dr. Bouhuys); Tr. 244-245 (App. 410) (Dr. Kilburn); Ex. 113 at 9 (App. 343) (Dr. Wolfe).

[20] As the Secretary stated, Dr. Bouhuys' estimate was based on a "conservative" definition of disability—i.e., a level of lung performance that "even for a very old person is a small fraction of the pulmonary performance of a 'normal lung'." *Ibid.*

ton textile workers by reducing the levels of employee exposure to cotton dust. The primary means the Secretary selected to achieve this objective was reduction of the permissible level of cotton dust in the air at the workplace.

The Secretary determined that for all operations other than weaving the permissible exposure level (PEL) would be 200 ug/m^3. This PEL, the Secretary recognized, will accomplish a significant reduction in the prevalence of acute and chronic respiratory diseases among cotton textile workers. The prevalence of acute byssinosis would be reduced from 26% to 13%, with the prevalence of Grade 2 byssinosis reduced from 8% to 3%. There are approximately 200,000 employees in the industry in the operations other than weaving, 43 Fed. Reg. 27379, col. 2. Thus, this PEL would reduce the number of employees suffering from acute byssinosis at any given time by at least 26,000; and the number of employees suffering from Grade 2 byssinosis at any given time would be reduced by at least 10,000.[21] A comparable reduction in the prevalence of chronic obstructive pulmonary disease would follow.

The Secretary was aware that with a PEL of 200 ug/m^3 there would still be a significant prevalence of cotton dust induced respiratory diseases among exposed workers—13% of these workers would still suffer acute byssinosis; 3% would still suffer Grade 2 byssinosis. 43 Fed. Reg. 27359, col. 2. The Secretary, however, determined "that achieving [a PEL of] 100 ug/m^3 [as urged by the unions] is not within the technological capabilities of the industry." *Id.* at 27360, col. 1.

---

[21] These figures are understated, for the reasons discussed at pp. 9-10, *supra*. In addition, they refer only to byssinosis and do not include other respiratory diseases induced by exposure to cotton dust. See pp. 5-6, *supra*.

With respect to weaving operations, the Secretary decided to raise the PEL from the then-current standard to 750 ug/m^3.[22] *Id.* at 27381, col. 1. The Secretary refused to adopt a lower PEL because "the evidence in the record supports the conclusion that engineering dust controls in weaving may not be feasible even with massive expenditures by the industry." *Id.* at 27360, col. 2.

The Secretary did not mandate any single method of achieving compliance with the PELs set in the final standard. Rather, the Secretary described several methods of dust control already in common use throughout the textile industry which could be applied singly or in combination, at the discretion of the regulated employer. *Id.* at 27362-67. The "application [of these methods of control] should bring the vast majority of cotton workplaces into compliance with the permissible exposure [limits] established in this standard." *Id.* at 27363, col. 2.

The Secretary determined, however, that the demand for control equipment that would result from establishment of the PELs would exceed the supply of such equipment for a substantial period of time. Accordingly, the Secretary in the standard gave all regulated employers four years in which to obtain and install the necessary control equipment. *Id.* at 27385, cols. 2-3. For this interim period, while employers are not required to use engineering controls to meet the PELs set by the standard, the Secretary imposed two stop-gap measures: (1) employers are required to provide appropriate respirators where exposure levels exceed the applicable PEL (29 C.F.R. § 1910.1043(f)(1)(i)); and (2) in the circumstance where an employee is exposed to cotton dust in excess of the PEL, and where a physician determines that he is physically unable to wear any respirator, the employer must offer such employee an opportunity to transfer, without loss of pay or other employment bene-

---

[22] See notes 14, 18, *supra*.

fits, to an available position having an exposure level at or below the PEL. 29 C.F.R. § 1910.1043(f)(2)(v).[23]

While accepting the use of respirators as an *interim* means of protection, the Secretary rejected the industry position that primary reliance be placed on respirators as a *long-term* solution to worker exposure to cotton dust. Based on the record before him, the Secretary found that "respirators have many disadvantages which preclude primary reliance or co-reliance on respiratory protection on an equal basis with engineering and work practice controls." 43 Fed. Reg. 27384, col. 3.[24]

---

[23] The standard also prescribes the use of respirators in certain limited circumstances after the expiration of the four-year period. 29 C.F.R. § 1910.1043(f)(1)(ii)-(v). In addition to the requirements with respect to exposure limits and respirators, the standard includes provisions regarding such matters as exposure monitoring (29 C.F.R. § 1910.1043(d)), medical surveillance (*id.*, § 1910.1043(h)), employee education and training (*id.*, § 1910.1043(i)), warning signs (*id.*, § 1910.1043(j)), and recordkeeping (*id.* § 1910.1043(k)). None of those discrete provisions is challenged in this Court.

[24] In making this finding, the Secretary relied upon the testimony of Bruce Held, project leader for respirator research at the Lawrence Livermore Laboratory of the University of California and former Chairman of the Atomic Energy Commission's Respiratory Advisory Committee. *Ibid.* Held testified:

> Respiratory protective devices have many limitations which make them undesirable if engineering controls are at all possible. Among the limitations of respirators are: A, fitting problems with persons with small faces, such as many women, with persons with facial hairs, such as beards or long sideburns, scars or growths which break the face piece to face seal, and with persons with pronounced wrinkling, a sunken nose bridge, deeply cleft chin, very narrow nose, a very wide or very narrow face, or very long or very short face; B, communication problems between workers wearing respirators. Any respirator will muffle voice communications to varying degrees. With many devices, the jaw movement used for speaking can break the face piece to face seal and cause inhalation of contaminated air; and C, vision problems can be numerous. Downward vision is obstructed with half or full face masks, thus increasing tripping or stumbling possibilities. The in-

III. The Technological Feasibility of the Standard

In this Court, the industry petitioners do not challenge the technological feasibility of the methods of compliance prescribed by the standard.[25]

IV. The Costs of the Standard

A. For those textile industry operations already in compliance with the PELs set by the standard, no dust control costs are imposed by the standard. At the time the standard was promulgated, in large portions of the industry exposure levels were already below the PELs set by the Secretary. An ATMI survey provided the most comprehensive set of data produced at the hearing respecting existing dust levels in the industry. Of the large sample of plants included in the survey, nearly 20% of the opening through roving operations,[26] and approximately 75% of the spinning operations, were already at or below the 200 ug/m^3 exposure level, while 88% of the weaving operations were already at or below the 750 ug/m^3 exposure level. Ex. 176.[27]

With respect to those operations *not* already in compliance, there is no dispute as to the cost estimate adopted by the Secretary for the operations of *opening through roving*. Industry attacks the Secretary's reliance on the cost estimates prepared by Hovan Hocutt and Arthur Thomas (Hocutt-Thomas) on the ground that for certain

---

ability to look straight down can cause a serious injury. Full face respirators will restrict the wearer to tunnel vision. Persons who must wear prescription glasses must be fitted with special glasses kits for full face masks.

* * * *

D, fatigue and reduced efficiency, and E, some people, for reasons of health, would not be permitted to wear a respirator. Tr. 483-485 (App. 412-413). See also pp. 51-55, *infra*.

[25] See ATMI Br. at 8, n.16.

[26] These operations are described at note 1, *supra*.

[27] This exhibit appears at pp. 3490-3560 of the joint appendix filed in the court of appeals.

operations those figures were meant to reflect the costs of achieving exposure levels higher than those ultimately set by the Secretary. (ATMI Br. 12, 16, 25.) That criticism is inapplicable to the Hocutt-Thomas estimate of $425 million to meet the standard's PEL in the opening through roving operations. For Hocutt-Thomas recognized that the controls they envisaged for those operations would enable employers to reduce exposure levels to 200 ug/m³.[28]

Nor does industry complain about the Secretary's estimate of the costs of satisfying the PEL applicable to *weaving* operations. The Secretary raised that PEL over what it previously had been, and in any event the cost estimate adopted by the Secretary for compliance in weaving operations is much higher than the estimate put forward by RTI, whose overall figures (including the estimate for weaving operations) industry now embraces.[29]

Thus, all that remains in controversy is the Secretary's estimate of the cost of compliance in the 25% of the *spinning* operations where exposure levels are in excess of 200 ug/m³. The Hocutt-Thomas study concluded that the cost of the control equipment necessary to reach 500 ug/m³ in spinning operations would be $17.7 million.[30]

---

[28] 43 Fed. Reg. 27380, Table 1, note 2. The Hocutt-Thomas estimate for the opening through roving operations is almost identical to the estimate in the record industry endorses—that stated in the report of the Research Triangle Institute (RTI). The Hocutt-Thomas estimate of the cost of control equipment to meet a 200 ug/m³ standard in these operations is $425.6 million. See Ex. 60 at 3-6 and Attachment #1 thereto (App. 236-239, 251); Ex. 62, Attachment II (App. 486). RTI's estimate is approximately $429.5 million (derived by applying a process-by-process ratio to the data in Ex. 6, No. 76 at I-15, V-17 (App. 74, 92).

[29] See 43 Fed. Reg. 27380, Table 1 (data for yarn processing).

[30] See Ex. 60 at 3-6 and Attachment #1 thereto (App. 236-239, 251); Ex. 62, Attachment II (App. 486). ATMI maintains that by comparing the RTI and the Hocutt-Thomas estimates for the costs of compliance in spinning operations, the effect of assuming a 500

The Secretary adopted that cost estimate, concluding for the following reasons that by using the dust control equipment Hocutt-Thomas prescribed, the 200 ug/m³ PEL could be met in spinning operations without significant additional costs:

> Hocutt maintained that it would not be feasible to reduce dust levels in all spinning operations to levels lower than 500 ug/m³. His position was based on the difficulty in working with some equipment, and the configuration or the lack of space needed to install ventilation equipment. OSHA is aware that confounding factors exist in some mills which make installation of ventilation equipment difficult. However, when more attention has been given to general principles of ventilation control, this has in many

---

ug/m³ PEL as opposed to a 200 ug/m³ PEL may be discerned. ATMI points to the fact that while the Hocutt-Thomas estimate for spinning operations based on a 500 ug/m³ PEL was $17.7 million, the RTI estimate for such operations based on a 200 ug/m³ PEL was $553.3 million. Thus, ATMI concludes, "the Hocutt-Thomas figures would have to be increased by at least $535 million if it were to be applied to achieving a [200 ug/m³] limit in spinning . . ." ATMI Br. at 26-27, n.53. That conclusion does not follow. RTI made its own separate cost estimate for spinning at the 500 ug/m³ PEL—approximately $113 million, or over 6 times the Hocutt-Thomas figure of $17.7 million. (The figure of $113 million is derived by applying a process-by-process ratio to the data in Ex. 6, No. 76 at I-15, V-17 (App. 74, 92)). This disparity is not a product of the PEL that was assumed. Rather, it is the product of erroneous factual assumptions underlying the RTI estimate.

In particular, RTI did not have data on the dust levels in the industry. RTI's cost calculations therefore assumed that all mills were operating at the exposure level permitted by the old standard (1000 ug/m³ total dust) and that no mill had installed any of the equipment RTI recognized as necessary to achieve a lower level. Ex. 16 at 29, 34-39 (App. 169-171); Tr. 617-619 (App. 418-420). Primarily because RTI ignored the actual conditions in the industry its study projected a $553 million cost for achieving a PEL of 200 ug/m³ in spinning. This estimate grossly overstated the cost because, contrary to RTI's assumption, the record shows that at the time of the rulemaking, exposure levels in the vast majority of spinning operations were below the old standard, and in 75% of such operations, exposure levels were already at or below 200 ug/m³

> instances sufficed to reduce levels to within those herein prescribed. Further, when the entire process is viewed rather than each operation independently, it becomes clear that reduction in dust levels in beginning operations may affect the levels in final operations.[31] Further, in some instances isolation of spinning from dustier operations could be utilized along with additional general ventilation improvements to bring levels to within those herein prescribed. In the past, application of the principles described above have been used successfully to reduce dust levels in the workplace, and it is reasonable to anticipate that this is what will be done now. [43 Fed. Reg. 27366, col. 3][32]

The Secretary determined that for all textile industry operations, the Hocutt-Thomas estimate of $550 million was a reasonable approximation of the cost of compliance with the standard. The Secretary noted, moreover, that Hocutt-Thomas had made certain assumptions which tended to overstate that cost. In particular, the Hocutt-Thomas estimate failed to reflect "the existing trend toward replacement of conventional [production] machines with newer equipment which is more productive

---

[31] In this regard the Secretary further stated:

> When each operation in the textile process is examined with regard to its relationship to subsequent operations, it is clear that reducing dust levels in operations from opening to roving would aid in the reduction of dust levels in areas of final processing such as spinning. 43 Fed. Reg. 27367, col. 1.

[32] For the operations connected with spinning (i.e., winding, spooling, twisting and warping), the Secretary likewise adopted the Hocutt-Thomas cost estimate. While Hocutt had maintained that the PEL for such operations should be set at 500 ug/m^3, the Secretary found that dust levels could easily be reduced to 200 ug/m^3 using the control methods Hocutt prescribed:

> Levels in all these operations are currently very low and are not expected to present a compliance problem . . . . OSHA . . . concludes that the vast majority of workplaces will be able to comply with little difficulty.

43 Fed. Reg. 27367, col. 2.

and produces less dust," and which results in "fewer machines to be retrofitted or controlled." 43 Fed. Reg. 27372, col. 3. The record—including a 1974 report that ATMI submitted to the United States Department of the Treasury—established that quite apart from the requirements of the cotton dust standard, the industry is in the process of a large-scale conversion to more modern production equipment which greatly eases the problem of dust control while bringing "higher production rates, labor savings and improved product quality." [33] But the Hocutt-Thomas estimate took no account of this important development; rather, that study calculated the cost of controlling cotton dust in the context of the particular machinery which was in place at the time of the study. Ex. 60 at 3-6 (App. 236-239).

B. RTI evaluated the ability of the industry to finance compliance with the standard at several different levels of cost. The highest cost level considered was more than

---

[33] *Id.* at 27363, cols. 1-2. See also *id.* at 27366, col. 3—27367, col. 1, 27370, col. 3—27371, col. 1, 27372, col. 3. The new equipment includes open-end spinning frames, which reduce dust levels in spinning while also eliminating the need for roving and winding operations; automatic opening equipment, which takes the place of manual opening and feeding; and chute-fed cards, which eliminate the picking operation and reduce dust levels in the carding process. Ex. 78 at 19 (App. 269). In the 1974 report referred to in the text ATMI represented that large segments of the industry were rapidly converting to this equipment, and would continue to do so. *Id.* at 20-23 (App. 269-273). Treasury agreed that this is the case. *Id.* at 24-26 (App. 273-276). The industry's ongoing conversion to this modern equipment was also documented by numerous technical reports, (*id.* at 28-30 (App. 278-280); Ex. 143, Appendices G, H (App. 367-371)), Union experience (Ex. 78 at 26-28, 33-35 (App. 277-278, 284-285)), expert testimony (Ex. 79A (App. 293-295)), and annual reports from textile companies to their stockholders (Ex. 78 at 30-33, and Appendices 15, 16 thereto (App. 281-283, 288-292)). As a 1977 article stated, the conversion to new equipment is a major reason why "the . . . description of the textile industry as a 'sick' industry does not hold water anymore." J. Yale, *The Economic Structure of the Textile Industry*, Ex. 143, Appendix F at 24 (App. 348, 350).

twice that which the Secretary found would be the actual cost of the standard he promulgated. 43 Fed. Reg. 27378, col. 2. At that high level, "nothing in the RTI study showed that the cotton [textile] industry as a whole [would] be seriously threatened. . . ." 43 Fed. Reg. 27378, col. 2. See Tr. 563. For the "much less severe" cost requirements of the standard actually promulgated, the Secretary concluded "that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation. . . ." 43 Fed. Reg. 27378, col. 2.[34]

SUMMARY OF ARGUMENT

I.

A. The Occupational Safety and Health Act (OSHA), and this Court's reading of that Act in *Industrial Union Depart.* v. *American Petrol. Inst.*, —— U.S. —— (Nos. 78-911 & 78-1036; July 2, 1980) (the *Benzene* case), establish the following proposition: *Congress* determined that the elimination or reduction of significant risks to employee health, through the most protective standards that are capable of achievement, justifies the substantial compliance costs that may be entailed.

---

[34] In reaching that conclusion, the Secretary took into consideration the ability of the industry to pass on the costs of the standard to consumers, and thus to maintain its existing profit levels. RTI stated that even at a level of costs twice that of the standard, the costs of compliance could ultimately be passed on to consumers. *Ibid.* This conclusion which the Secretary accepted was based on two factors. First, as Chase Manhattan Bank's textile industry specialist testified, even if the price of cotton products were to rise, synthetic fiber products are not likely to make a significant further penetration into the market for cotton textile products. Tr. 2559-62 (App. 474-476). As the Secretary noted, the recent increases in the price of petroleum, from which synthetic fibers are made, make it even less likely that cotton products will be unable to compete successfully with synthetics. 43 Fed. Reg. 27370, col. 2. Second, trade agreements give the domestic textile industry substantial protection against competition from imports. Ex. 6, No. 76 at VI-4 (App. 95).

The instant case is governed by §§ 3(8) & 6(b)(5) of OSHA. The *Benzene* case establishes that, at the least, these provisions "direct[]" the Secretary, where he makes the

> threshold finding that a place of employment is unsafe—in the sense that significant risks are present and can be eliminated or lessened by a change in practices . . . to select 'the standard' . . . that is most protective . . . [and that is] consistent with feasibility. [Opinion of Stevens, J., Sl. Op. 32, 33 n. 48; Opinion of Marshall, J., Sl. Op. 4-7, 30-33].

1. The language of §§ 3(8) & 6(b)(5) does not contain a hint that the Secretary, as a prerequisite to regulation, must, in addition to finding a significant risk to worker health, place a value upon the elimination or substantial diminution of that risk and then assess whether that value is in reasonable balance with the compliance costs of the regulation. The basic thrust of § 6(b)(5) is to the contrary: subject to the constraint of feasibility, the Secretary is directed to promulgate "*the*" standard that "*most* adequately assures" that "*no* employee will suffer material impairment. . . ."

2. The legislative history of OSHA shows that Congress meant exactly what the statutory language says. The first sentence of § 6(b)(5) was the product of a legislative search for a formula that would provide health standards "as effective as possible," while precluding the elimination of risks by eliminating the affected occupation or industry.

A more general review of the debate preceding OSHA's enactment confirms that Congress, understanding perfectly that the statute would require American industry to make large outlays of money, concluded that workers should not subsidize the production of goods with their health and that the cost of health and safety protection at the workplace should be counted as a cost of doing business reflected in the prices of goods in the market place. The legislative materials reveal no dissent from

that approach. No legislator espoused the theory that the protection of worker health should be compromised on the basis of a cost-benefit assessment.

Congress was fully aware of the consequences of its determination. Congress realized, for example, that the additional costs of doing business that would be required to comply with OSHA standards might threaten the viability of a great number of small employers. The legislative response was not, however, to dilute the mandate of § 6(b)(5) (or the other substantive provisions of the Act) or to exempt small employers from its reach. Rather, Congress established in § 28 of the Act a program to provide loans to small businesses to be used to achieve compliance with the standards promulgated by the Secretary.

B. It follows from the language of the statute, read in light of its legislative history and the *Benzene* opinion, that the test for determining whether a standard promulgated by the Secretary to regulate a toxic material meets the requirements of OSHA has three parts: first, whether the "place of employment is unsafe—in the sense that significant risks are present and can be eliminated or lessened by a change in practices." Opinion of Stevens, J., Sl. Op. 32. Second, whether, of the possible available correctives, the Secretary has selected "*the* standard . . . that is most protective." *Ibid.* Third, whether that standard is "feasible." The standard here meets that test.

1. The standard would reduce the number of workers suffering from acute byssinosis at any given time by at least 26,000; and the number of workers suffering from Grade 2 byssinosis at any given time would be reduced by at least 10,000. A comparable reduction in the prevalence of chronic obstructive pulmonary disease would follow.

2. ATMI does not contend that the Secretary failed to adopt the "most protective" standard. Rather, ATMI's

contention is that the "alternative" compliance scheme it proposed in the rulemaking provides cotton textile workers health protection "not significantly" less than that afforded by the Secretary's final standard and at a much lower cost. The ATMI alternative, however, falls far short of offering health protection equivalent to the Secretary's standard.

3. In this Court, the industry does not dispute the technological feasibility of the standard. As to economic feasibility, the Secretary's estimate that the total cost of compliance with the standard would be approximately $550 million is supported by the record. On the basis of the RTI analysis of the industry's ability to finance the cost of compliance with the standard, the Secretary concluded "that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation." And Congress did not intend the potential economic dislocation of marginal employers to bar the Secretary from regulating. In the provisions at issue here, as in the statute considered in *EPA* v. *National Crushed Stone Assn*, —— U.S. —— (No. 79-770; Dec. 2, 1980),

> Congress foresaw and accepted the economic hardship, including the closing of some plants, that [regulation] would cause; and Congress . . . took certain steps to alleviate this hardship, steps which did not include allowing a . . . [relaxation of the appropriate protective standards]. [Sl. Op. 14.]

II.

In this standard the Secretary provided an interim protection to workers who are exposed to concentrations of cotton dust in excess of the permissible level and who are found by a physician to be unable to wear a respirator: he required cotton mill operators to give such employees an opportunity to transfer to available lower exposure jobs without suffering a loss of earnings. The record showed that absent earnings protection the trans-

fer provision integral to the Secretary's interim scheme for worker protection would have been frustrated. ATMI contends that the Secretary was without statutory authority to promulgate this provision. But the Secretary's action falls well within the terms of § 6(b)(7) which authorizes him "[w]here appropriate [to] prescribe suitable . . . control procedures to be used in connection with [occupational health] hazards. . . ." And it comports with Congress' determination that compliance costs should be borne by employers as reasonable and necessary costs of doing business.

ARGUMENT

I. THE SECRETARY IN SETTING THE COTTON DUST EXPOSURE LIMITS CARRIED OUT THE MANDATE OF §§ 3(8) AND 6(b)(5) OF OSHA

A. The Governing Statutory Principles

The Occupational Safety and Health Act (OSHA), and this Court's reading of that Act in *Industrial Union Depart.* v. *American Petrol. Inst.*, —— U.S. —— (Nos. 78-911 & 78-1036; July 2, 1980) (the *Benzene* case), we believe, establish the following proposition: *Congress* determined that the elimination or reduction of significant risks to employee health, through the most protective standards that are capable of achievement, justifies the substantial compliance costs that may be entailed. Petitioners, in contrast, insist that OSHA does *not* reflect a Congressional decision on when the costs of a health standard are justified, but rather, leaves that question to the Secretary and to the judiciary to "assess[] costs and risk reduction benefits" and to decide, on a basis not disclosed, whether "there is a reasonable relationship between the two." ATMI Br. 39.

1. Regulation of industrial activity in order to promote the public interest in health and safety implicates a variety of complex practical and moral dilemmas. Recognizing the variousness of the problems, Congress has not adopted a single approach to such regulation. The

balance struck between health goals and technological and economic constraints in the legislative programs for purifying the air, cleaning the water, assuring wholesome supplies of food, providing drugs that serve their intended therapeutic purpose, regulating airplane and automobile safety and prohibiting dangerous consumer products, differs from statute to statute, often in basic concept, always in detail.[35] Thus, in proceedings challenging such regulation:

> The question . . . is not what a court thinks is generally appropriate to the regulatory process; it is what Congress intended for *these* regulations. [*EPA* v. *National Crushed Stone Assn.*, —— U.S. —— (No. 79-770; Dec. 2, 1980) Sl. Op. 18 (quoting *E.I. du Pont de Nemours* v. *Train*, 430 U.S. 112, 138) (elision and emphasis in original)].

2. In the instant case "these regulations" are governed by §§ 3(8) & 6(b)(5) of OSHA. The former states:

> The term 'occupational . . . health standard' means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide . . . healthful employment and places of employment.

The latter provides in pertinent part:

> The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. . . .

---

[35] In these different statutes Congress has adopted a variety of approaches, some of which require a balancing of costs and benefits and other of which do not. We survey these statutes in Appendix B to this brief.

The *Benzene* case establishes that, at the least, these provisions "direct[]" the Secretary, where he makes the

> threshold finding that a place of employment is unsafe—in the sense that significant risks are present and can be eliminated or lessened by a change in practices[—] . . . to select 'the standard'—that is to say, one of various possible alternatives that satisfy the basic definition in § 3(8)—that is most protective . . . [and that is] consistent with feasibility. [Opinion of Stevens, J., Sl. Op. 32, 33 n. 48; Opinion of Marshall, J., Sl. Op. 4-7, 30-33].

"[B]oth the language and structure of the Act, as well as its legislative history, indicate that it was intended to require the elimination, as far as feasible, of significant risks of harm". *Id.* Opinion of Stevens, J., Sl. Op. 31.[36]

3. The statutory language and the legislative history show that Congress intended the Secretary to issue the most protective standards to correct significant employee health risks subject *only* to the following limitation: the Secretary is not to follow the self-defeating course of assisting employees by eliminating their entire occupation either through pursuit of the chimera of a risk-free environment or by the imposition of economic burdens beyond

---

[36] This conclusion, Justice Stevens noted, is supported also by both §§ 6(a) & 6(b)(8). "Section 6(a) requires the Secretary, when faced with a choice between two national consensus standards, to choose the more protective standard." *Id.* Sl. Op. 32, n. 47. "Section 6(b)(8), in turn,

> requires that, when the Secretary substantially alters an existing consensus standard, he must explain how the new rule will 'better effectuate' the purposes of the Act. . . . [T]his requirement . . . must be read to impose upon the Secretary the duty to find that an existing national consensus standard is not adequate to protect workers from a continuing and significant risk of harm." [*Id.*, Sl. Op. 34.]

See also § 2(b) which states OSHA's overall purpose—*viz.*, "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources."

the capacity of their industry to bear. Congress understood that its approach would often impose substantial costs on an industry, costs that might be beyond the financial capacity of the marginal employers. But Congress' judgment was that the expenditures made to protect workers against significant health risks should be considered reasonable and necessary costs of doing business to be reflected in the regulated industry's prices.

a. The language of §§ 3(8) and 6(b)(5) does not contain a hint that the Secretary, as a prerequisite to regulation, must value the elimination or substantial diminution of a significant health risk and assess whether that value is in reasonable balance with the compliance costs of the regulation. The basic thrust of the first sentence of § 6(b)(5), which with regard to the regulation of "toxic materials and harmful physical agents" particularizes the general definition of a "standard" in § 3(8), evinces a dedication to protecting employee health: the Secretary is directed to promulgate "*the*" standard that "*most* adequately assures" that "*no* employee will suffer material impairment . . ."

To be sure, these sections are not without terms of limitations: the regulation is to be directed to "*toxic* materials or *harmful* physical agents"; the unhealthy condition that the regulation seeks to prevent must be a "*material* impairment"; the regulation "must be *reasonably necessary* and *appropriate* to provide *healthful* employment"; and the goal of worker protection is to be pursued "to the extent *feasible*." But these limitations do not import an obligation to weigh the benefits of regulation against the costs. At most, they suggest that the Secretary is required to show that the condition he intends to regulate constitutes a significant threat to health (regulate "*toxic* materials or *harmful* physical agents" to prevent a "*material* impairment"), that the proposed regulation promises to end, or, in substance, to correct, that unhealthy condition (that it is "*reasonably* necessary

and *appropriate* to provide *healthful* employment"),[37] and that the proposed regulation is "capable of being done, executed or effected; possible of realization" [38] (is "feasible").

On the face of the statute, then, once the Secretary determines that a toxic substance in the workplace poses a significant risk of a material health impairment to exposed employees, his obligation is to promulgate the standard which, within the limits of what is possible, eliminates or substantially reduces that risk—the most protective standard feasible.

b. The legislative history of OSHA shows that Congress meant exactly what the statutory language says.

(i) *The § 6(b)(5) Debate.* The first sentence of § 6 (b) (5), as we have seen, specifies the criteria for estab-

---

[37] As Mr. Justice Marshall observed in the *Benzene* case:

> "[R]easonably necessary or appropriate" clauses are routinely inserted in regulatory legislation, and in the past such clauses have uniformly been interpreted as general provisos that regulatory actions must bear a reasonable relation to those statutory purposes set forth in the statute's substantive provisions. See, e.g., *FCC* v. *National Citizens Committee for Broadcasting*, 436 U.S. 775, 796-797 (1978); *Mourning* v. *Family Publications Service, Inc.*, 411 U.S. 356, 369 (1973); *Thorpe* v. *Housing Authority of the City of Durham*, 393 U.S. 268, 280-281 (1969). . . . This principle, of course, reflects the common understanding that the determination of whether regulations are "reasonably necessary" may be made only by reference to the legislative judgment reflected in the statute; it must not be based on a court's own, inevitably subjective view of what steps should be taken to promote perceived statutory goals. [Opinion of Marshall, J., Sl. Op. 21-22.]

Against this background, and in light of the fact that, so far as we have ascertained, there is not a word in the legislative history expanding on or even referring to the language of that provision, § 3(8) cannot support the conclusion that OSHA requires the Secretary to weigh the benefits of regulation against the costs. See also *infra* pp. 35-39.

[38] Webster's Third New International Dictionary, 831 (1961) (defining "feasible").

lishing health standards.[39] The evolution of those criteria is a development on the theme stated by Senator Dominick, who was the spokesman in the Senate for the Nixon administration and a principal participant in shaping § 6(b)(5):[40]

> The duty to set standards and produce criteria for standards implies that the criteria and the standards will be as effective as possible; not that they will produce a perfect environment. No human effort can produce a perfect environment no matter how hard we try. [Leg. Hist. 376.]

---

[39] The remainder of that provision states:

> Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws.

It is inherently unlikely that this language, which was adopted by the Senate Committee, informs a proper understanding of the first sentence of § 6(b)(5) as amended on the Senate floor to clarify the meaning of the Committee bill. See pp. 31-35, *infra*. And in fact, the final two sentences do not alter the substantive criteria for health standards stated in the first sentence. Those sentences merely set forth the types of evidence the Secretary is to consider in carrying out the mandate of the first sentence—types of evidence which include not only "research, demonstrations, [and] experiments," but also "such other information as may be appropriate."

[40] Senator Dominick was the sponsor of S. 4404, introduced on behalf of the Nixon Administration as a substitute for S. 2193 (the "Williams bill") after it became apparent that the latter bill would be reported out of the Committee on Labor and Public Welfare. See Legislative History of the Occupational Safety and Health Act of 1970 (Leg. Hist.) 73, 510. (On the Senate floor, the Dominick substitute was tabled by a vote of 41 to 39 the day before S. 2193 was passed. Leg. Hist. 448-450). Senator Dominick's prominent role in the development of the legislation was noted by his fellow Senators. For example, Senator Javits observed that Senator Dominick's "efforts had a vital impact on the bill in terms of principle and fairness. . . ." Leg. Hist. 526. See also Leg. Hist. 527 (remarks of Senator Williams).

The legislative process in this instance was a search for a formula that would provide health standards "as effective as possible," while precluding the elimination of risks by eliminating the affected occupation or industry. The effort was to advance toward the ideal of worker health and safety while recognizing the limits on our ability both to maintain an industrial society and to provide a risk free environment.

House and Senate consideration of OSHA proceeded on virtually a simultaneous schedule. In the House the Act began as "the Daniels bill," H.R. 16785; in the Senate it was introduced as "the Williams bill," S. 2193. Neither bill contained a provision setting the criteria governing the issuance of toxic substance standards.[41] That provision was added to each measure in committee.[42]

The provision governing issuance of health standards reported by the House Committee on Education and Labor on July 9, 1970, contained no "feasibility" limitation. The Secretary was to be required to

> set the standard which most adequately assures, on the basis of the best available professional evidence, that no employee will suffer any impairment of health or functional capacity, or diminished life expectancy even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.[43]

On October 6, 1970, the Senate Committee on Labor and Public Welfare reported out virtually the same provision but with one significant change: the words "and feasibly" were added so that the Secretary's mandate was

---

[41] See Leg. Hist. 721, 728-732 (Daniels bill), 1, 6-7 (Williams bill).

[42] The standard setting criteria added by the two committees were applicable to all standards (see materials cited at p. 35 and n.56, *infra*), but as enacted the first sentence of § 6(b)(5) is framed to apply solely to standards for "toxic materials and harmful physical agents."

[43] H.R. Rep. No. 91-2191, *supra* at 4, Leg. Hist. 834.

to "set the standard which most adequately *and feasibly* assures. . . ." [44] This additional language resulted from an amendment offered in Committee by Senator Javits, the ranking Republican and a key figure throughout the Senate's deliberation on OSHA.[45] Senator Javits explained that his amendment "was an improvement over the Daniels bill [because the latter as reported out of committee in the House] might be interpreted to require *absolute* health and safety in all cases, regardless of feasibility. . . ." [46]

The Senate Committee report that accompanied S. 2193 made clear the Committee's understanding of the Javits

---

[44] Leg. Hist. 204, 242.

[45] See e.g., Leg. Hist. 1151.

[46] S. Rep. No. 91-1282, *supra* at 58 (individual views of Senator Javits), Leg. Hist. 197 (emphasis added). Senator Javits described his "feasibility" amendment as an improvement over not only the Daniels bill, but also "the [original] Administration bill which contain[ed] no criteria for standards at all." *Ibid.* That bill, S. 2788, had been introduced by Senator Javits on August 6, 1969. See S. Rep. No. 91-1282 at 5, Leg. Hist. 145. Its provisions regarding the setting of standards appear at Leg. Hist. 31, 36-42.

ATMI states that "Senator Javits, the author of the original Administration bill (S. 2788), took the position that OSHA standards should be 'feasible' in the sense of being 'reasonable' and 'practicable' as well as technologically achievable." ATMI Br. 32-33. This misstates Senator Javits' role and his words. President Nixon's message accompanying the bill drafted by his Administration "described" the provision calling for a report on "technical feasibility, reasonableness, and practicality" as a "report on the feasibility of the proposed standards." 115 Cong. Rec. 22511, 22517. Thus Senator Javits did not author S. 2788 or "describe" the report in such terms at all. Senator Javits merely asked that the President's lengthy message be printed in the Congressional Record. 115 Cong. Rec. 22511. Rather than endorsing the message, Senator Javits disassociated himself from the Administration's bill on a variety of issues, saying that "it may be desirable to go somewhat further than this bill does in strengthening the hand of the Federal Government in this area." 115 Cong. Rec. 22512. When Senator Javits actually described his feasibility amendment he consistently used only the word "feasible" and never equated that term with "reasonable" or "practical." Leg. Hist. 197, 418.

amendment by paraphrasing the bill's language in the following terms:

> [S]tandards should be directed at assuring, *so far as possible*, that no employee will suffer impaired health or functional capacity, or diminished life expectancy, by reason of exposure to the hazard involved, even though such exposure may be over the period of his entire working life.[47]

The "feasibility" language reported by the Committee was refined on the floor of the Senate as the final matter considered prior to passing S. 2193. Notwithstanding the inclusion in the Committee bill of both § 3(8) and the Javits amendment, several Senators—most notably Senator Dominick—expressed concern that § 6(b)(5) could nevertheless be read to accomplish what Senator Javits had sought to avoid. Senator Dominick explained:

> [Section 6(b)(5)] is inherently confusing and unrealistic. It could be read to require the Secretary to ban all occupations in which there remains *some* risk of injury, impaired health, or life expectancy. In the case of all occupations, it will be impossible to eliminate all risks to safety and health. Thus, the present criteria could, if literally applied, close every business in this nation. In addition, in many cases, the standard which might most "adequately" and "feasibly" assure the elimination of the danger would be the prohibition of the occupation itself.[48]

In light of that concern, Senator Dominick proposed an amendment to delete from § 6(b)(5) the entire sentence setting forth the criteria for the promulgation of standards.[49]

Throughout the floor debate that ensued, Senator Dominick's remarks were consistently directed at a single

---

[47] S. Rep. No. 91-1282, *supra* at 7, Leg. Hist. 147 (emphasis added).

[48] Leg. Hist. 367; emphasis in original.

[49] Amendment No. 1054, Leg. Hist. 365-366.

concern: that the language proposed by the Committee could be read as requiring an absolutely risk-free workplace—a requirement that could be met only by shutting down entire industries and by eliminating occupations.[50] He gave the following example:

> How in the world, . . . during a working day of any one driving a bus . . . can we set standards that will make sure he will not have any risk to his life for the rest of his life? It is totally impossible for this to be put in a bill; and yet it is in the committee bill.[51]

As part of his argument, Senator Dominick stressed also that work of any nature necessarily has an impact on the human body and, ultimately, on life expectancy, and that seeking to eliminate all such effects would amount to a ban on all employment. In this connection,

---

[50] It is unrealistic to attempt, as [§ 6(b)(5)] apparently does, to establish a utopia free from any hazards. Absolute safety is an impossibility and it will only create confusion in the administration of this act for the Congress to set clearly unattainable goals.

* * * * *

The difficulty of the language I am dealing with here and that I am trying to delete is the requirement that the Secretary, in establishing standards, must assure that there will not be any risk at all.

* * * * *

Almost any kind of occupation one can think of has something which is inherently hazardous simply by the fact that one is living and breathing and there is no way a criteria [sic] can be established so that an employee would not be faced with some risk for the period of his working life.

* * * * *

Let us take the case of a bus driver. There is no possible way that a bus driver for the rest of his life could be assured that he is not going to get regular exposure to these hazards. By the very nature of driving a bus over the road, no matter how many safety tires and signals are on the bus, it is a hazardous occupation.

Leg. Hist. 480-481. See also Leg. Hist. 345-346, 400-401.

[51] Leg. Hist. 423.

Senator Dominick stated that "[s]imply being in a work environment where one is responsible for certain duties . . . produce[s] in most people impaired health, and it certainly diminishes life expectancy to some extent." [52] In the same vein, Senator Saxbe noted that "[w]orking itself is apt to diminish one's life expectancy. If one wants to stay home in bed, he probably will live longer than by standing at the plant and doing his job." [53]

Senator Dominick summed up his objections to the Senate Committee version of § 6(b)(5) in the following terms:

> Any administrator responsible for enforcing the statute will be faced with an impossible choice. Either he must forbid employment in all occupations where there is any risk of injury, even if the technical state of the art could not remove the hazard, or he must ignore the mandate of Congress. . . .
>
> The confusion inherent in this provision will, in my opinion, render it no more than a hortatory admonition to the Secretary to fulfill his responsibilities under the act. [T]here is no point in putting in criteria which cannot be met.[54]

No concern of any other nature with regard to § 6(b)(5) was raised by any Senator. The view that the Secretary was to require what is "possible," not what is perfect, where the latter choice would be to forbid "employment in [an] occupation where there is any risk of injury" reflected the consensus of the Senate. When that became apparent, the chief spokesman on both sides of the aisle—Senators Williams, Javits and Dominick—translated that consensus into a modification of the Committee's version of § 6(b)(5) which was "agreeable to all." [55]

---

[52] Leg. Hist. 376.

[53] Leg. Hist. 337.

[54] Leg. Hist. 481.

[55] Leg. Hist. 502.

That modification was embodied in a substitute amendment, introduced by Senator Dominick, consisting of the language of § 6(b)(5) as eventually enacted. In the colloquy immediately preceding passage of that amendment Senators Dominick and Williams confirmed the amendment's purpose:

> Mr. Dominick: . . .
>
> What we were trying to do in the bill—unfortunately, we did not have the proper wording or the proper drafting—was to say that when we are dealing with toxic agents or physical agents, we ought to take such steps as are feasible and practical to provide an atmosphere within which a person's health or safety would not be affected. Unfortunately, we had language providing that anyone would be assured that no one would have a hazard, . . . no one would have any problem for the rest of his working life.
>
> It was an unrealistic standard. As modified, we would be approaching the problem by looking at the problem and setting a standard or criterion which would not result in harm.
>
> * * * *
>
> It is my understanding, if I may say so, that what we are doing now is to say that the Secretary has got to use his best efforts to promulgate the best available standards, and in so doing, that he should take into account that anyone working in toxic agents or physical agents which might be harmful may be subjected to such conditions for the rest of his working life, so that we can get at something which might not be toxic now, if he works in it a short time, but if he works in it the rest of his life it might be very dangerous; and we want to make sure that such things are taken into consideration in establishing standards; is that correct?
>
> Mr. Williams of New Jersey: That is exactly correct. . . . I think it is clear, the objectives have been stated, and it strengthens the objectives of

> standards that will protect against physical impairment and loss of function.[56]

The first sentence of § 6(b)(5) was therefore modified to apply only to "toxic materials and harmful physical agents," rather than to every type of work hazard; to change the phrase "adequately and feasibly assures" to "adequately assures, to the extent feasible;" to refer to "material impairment" rather than to "any impairment;" and to delete the vague concept of "diminished life expectancy." As so amended, the Senate passed S. 2193.

The House, meanwhile, passed a substitute bill which did not contain criteria governing the setting of health standards.[57]

In conference, the House receded and accepted § 6(b)(5) precisely as the Senate had passed it. In receding, the House insisted on an amendment which became § 6(b)(6)(A). As described in the Conference Report, that section provides:

> that employers may petition for a temporary variance from an occupational health or safety standard if they are unable to comply with a standard for the following limited reasons: unavailability of professional or technical personnel or of necessary materials or equipment or because necessary construction or alteration of facilities cannot be completed in time. *Economic hardship is not to be a consideration for the qualification for a temporary extension order.*[58]

(ii) *Congressional Consideration of Costs.* A more general review of the debate preceding OSHA's enactment confirms the natural implication of the emphasized portion of the Conference Report: Congress, understanding

---

[56] Leg. Hist. 502-503.

[57] Leg. Hist. 1092-1118.

[58] H.R. Rep. No. 91-1765, 91st Cong., 2d Sess. 35, Leg. Hist. 1188 (emphasis supplied).

perfectly that the statute would require American industry to make large outlays of money, concluded that workers should not subsidize the production of goods with their health and that the cost of health and safety protection at the workplace should be counted as a cost of doing business reflected in the prices of goods in the market place.

Senator Williams, who introduced the initial Senate version of the bill and served as floor manager, explained the economic philosophy of OSHA as follows: "We know the costs w[ill] be put into consumer goods but that is the price we should pay for the 80 million workers in America." [59]

Senator Eagleton, another proponent, added:

> The costs that will be incurred by employers in meeting the standards of health and safety to be established under this bill are, in my view, reasonable and necessary costs of doing business. Whether we, as individuals, are motivated by simple humanity or by simple economics, we can no longer permit profits to be dependent upon an unsafe or unhealthy worksite.[60]

The judgment that the costs of employee health and safety should be spread through the economy, rather than be borne by workers, was described by Senator Yarborough, a co-sponsor of the Senate bill, in response to interest group complaints that such legislation would prove too expensive:

> One may well ask too expensive for whom? Is it too expensive for the company who for lack of proper safety equipment loses the service of its skilled employees? Is it too expensive for the employee who loses his hand or leg or eyesight? Is it too expensive for the widow trying to raise her children on meager allowance under workmen's compensation and social

---

[59] Leg. Hist. 444.

[60] Leg. Hist. 1150-1151.

> security? And what about the man—a good hard-working man—tied to a wheel chair or hospital bed for the rest of his life? That is what we are dealing with when we talk about industrial safety.
>
> We should have uniform standards so that no one industry would gain an advantage over any other industry. It would be far cheaper for our economy. It would save money in workmen's compensation premiums.
>
> We are talking about people's lives, not the indifference of some cost accountants. We are talking about assuring the men and women who work in our plants and factories that they will go home after a day's work with their bodies intact. We are talking about assuring our American workers who work with deadly chemicals that when they have accumulated a few years seniority they will not have accumulated lung congestion and poison in their bodies, or something that will strike them down before they reach retirement age.[61]

The legislative materials reveal no dissent from the approach stated by these Senators. No legislator espoused the theory that the protection of worker health should be compromised on the basis of a cost-benefit assessment.

Congress was fully aware of the consequences of its determination. Congress realized, for example, that the additional costs of doing business that would be required to comply with OSHA standards might threaten the viability of a great number of small employers. The legislative response was not, however, to dilute the mandate

---

[61] Leg. Hist. 510. See also, e.g., Leg. Hist. 1030-1031 (remarks of Representative Dent):

> Although I am very much disturbed over adding new costs to the operation of our production facilities . . . I would say there is a greater concern and that must be for the production men who do the producing—the men who work in the service industries and the men and women who daily go out and keep the economy moving and make it safe for all of us to live and to work and to be able to prosper in it.

of § 6(b)(5) (or the other substantive provisions of the Act) or to exempt small employers from its reach. To have done so would have undermined a central premise of the regulatory scheme:

> Although many employers in all industries have demonstrated an exemplary degree of concern for health and safety in the workplace, their efforts are too often undercut by those who are not so concerned. Moreover, the fact is that many employers—particularly smaller ones—simply cannot make the necessary investment in health and safety, and survive competitively, unless all are compelled to do so. The competitive disadvantage of the more conscientious employer is especially evident where there is a long period between exposure to a hazard and manifestation of an illness. In such instances a particular employer has no economic incentive to invest in current precautions, not even in the reduction of workmen's compensation costs, because he will seldom have to pay for the consequences of his own neglect.[62]

Rather, Congress established in § 28 of the Act a program to provide loans to small businesses to be used to achieve compliance with the standards promulgated by the Secretary. Senator Dominick stated the intent of § 28:

> [The small business program] permits the Secretary to make loans to small businesses wherever the standards that are set by the National Government are so severe as to have caused a real and substantial economic injury. Under those circumstances the Secretary is entitled, through the Small Business Administration, to make loans to those businesses to get them over the hump, because of the need for the new equipment, or because of new conditions within the shop, which would permit them to continue in operation.
>
> I think this is a very significant and important provision for minimizing economic injury which

---

[62] S. Rep. 91-1282, *supra*, at 4; Leg. Hist. 144.

could occur if the bill resulted in situations which would have very serious effects on businesses.[63]

4. The Congressional judgment expressed in the statutory scheme just outlined is that the elimination or substantial reduction of significant worker health risks justifies the costs of the most protective standard that does not endanger the productive activity that occasioned those risks. That judgment constitutes a rational approach to the problem of assuring that "industrial hygiene resources are not being squandered or misallocated in a fashion that produces very little health benefit . . . ." ATMI Br. 40. Such allocative judgments are precisely the kind the Constitution delegates to *Congress*. It is the legislative branch that is to "decide the order of priorities in a given area." *TVA* v. *Hill*, 437 U.S. 153, 194.

The Congressional judgment stated in OSHA is indeed, if that is deemed relevant, eminently sound, given the state of our knowledge and wisdom. On the other hand, ATMI's posit that the Secretary and the judiciary should "assess[] . . . costs and risk reduction benefits" and determine whether "there is a reasonable relationship between the two" (Br. 39), quite aside from its deficiency in leaving the Secretary and the courts at large, creates only the beguiling illusion of scientific rigor and logical decisionmaking. In reality such assessment will at best be accurate only within a wide range. And, of course, there is no agreement on the mediating principle for determining the "reasonable relationship" between eliminating or substantially diminishing significant worker health risks and the compliance costs entailed.[64] See,

---

[63] Leg. Hist. 525.

[64] These difficulties are enormously increased by ATMI's embellishment that the Secretary is to consider "the impact that [the proposed] standard would have on the industry's ability to address other, more significant health and safety risks in the future . . . ." ATMI Br. 41.

The "logic" of this suggestion requires that the Secretary, before he can promulgate a standard to protect employees against any

e.g., House Comm. on Interstate and Foreign Commerce, Subcomm. on Oversight and Investigations, *Federal Regulation and Regulatory Reform*, 95th Cong., 1st Sess. 515 (1976) ("[t]he limitations on the usefulness of benefit/cost analysis in the context of health, safety, and environmental regulatory decision-making are so severe that they militate against its use altogether").

Congress need not, of course, have taken these difficulties into account. Certainly, however, the legislature was not obliged to ignore them.

B. The Statutory Principles Applied

It follows from the language of the statute, read in light of its legislative history and the *Benzene* case, that the test for determining whether a standard promulgated by the Secretary to regulate a "toxic material or harmful physical agent" meets the requirements of OSHA has

---

health hazard, must inventory the other hazards possibly faced by those employees and then compare the relative costs and benefits of the proposed standard with the costs and benefits of regulating each of the other possible hazards. And industry would read the Act to require the Secretary to embark on that task despite the recognition by the sponsors that:

> In the field of occupational health . . . [there is a] lack of information and records, ...
>
> . . . [M]aterials long in industrial use are only now being discovered to have toxic effects. . . . [T]echnological advances and new processes in American industry have brought numerous new hazards to the workplace. . . . It is estimated that every 20 minutes a new and potentially toxic chemical is introduced into industry. New processes and new sources of energy present occupational health problems of unprecedented complexity.
>
> Recent scientific knowledge points to hitherto unsuspected cause-and-effect relationships between occupational exposures and many of the so-called chronic diseases—cancer, respiratory ailments, allergies, heart disease, and others.

S. Rep. No. 91-1282, *supra* at 2-3, Leg. Hist. 142-143. Nevertheless under industry's construct, to do anything the Secretary would have to investigate and evaluate everything.

three parts: First, whether the "place of employment is unsafe—in the sense that significant risks are present and can be eliminated or lessened by a change in practices." Opinion of Stevens, J., Sl. Op. 32. Second, whether of the possible available correctives the Secretary has selected "*the* standard . . . that is most protective." *Ibid.* Third, whether that standard is "feasible." The standard here meets that test.

1. *Significant Risk.* The risk of contracting chronic or acute respiratory disease from exposure to cotton dust at the workplace is precisely the type of risk that Congress determined should be eliminated or substantially diminished through OSHA health standards. The Senate Report on OSHA states:

> In the field of occupational health the view is particularly bleak. . . . Occupational diseases which first commanded attention at the beginning of the Industrial Revolution are still undermining the health of workers. . . . Workers in the dusty trades still contract various respiratory diseases.
>
> * * * *
>
> Studies of particular industries provide specific emphasis regarding the magnitude of the problem. For example, despite repeated warnings over the years from other countries that their cotton workers suffered from lung disease, it is only within the past decade that we have recognized byssinosis as a distinct occupational disease among workers in American cotton mills. Recent studies now show that this illness, caused by the dust generated in the processing of cotton, and resulting in continuous shortness of breath, chronic cough and total disablement, affects substantial percentages of cotton textile workers. In some states as many as 30% of those in the carding or spinning rooms have been affected, and it has been estimated that as many as 100,000 active or retired workers currently suffer from his disease.[65]

---

[65] S. Rep. 91-1282, *supra* at 2-3; Leg. Hist. at 142-143.

The record in this case bears out Congress' assessment: Textile workers are permanently disabled by chronic obstructive pulmonary disease at more than three times the rate of comparable populations not exposed to cotton dust. By "conservative" estimate, approximately 35,000 present or former textile workers are currently permanently disabled by that disease.

The Merchant study credited by the Secretary found that 26% of the approximately 200,000 workers in yarn manufacturing operations (52,000 workers) would contract some form of acute byssinosis if exposed at a concentration of 500 ug/m^3 of elutriated cotton dust—an exposure level equivalent to that permitted by the previous federal government standard.

The Merchant study also broke down the data on prevalence rates by grade of byssinosis. This breakdown shows that the prevalence of Grade 2 byssinosis for yarn manufacturing operations is 8% (approximately 16,000 workers) at an exposure level of 500 ug/m^3. And the authors of the study emphasized that the data underestimated the prevalence rates of Grade 2 byssinosis and of chronic obstructive pulmonary disease.

Finally, the Merchant study showed that at the PEL set by the standard the prevalence of byssinosis in yarn manufacturing would be reduced to 13%, and the prevalence of Grade 2 byssinosis would fall to 3%. Thus, this PEL would reduce the number of workers suffering from acute byssinosis at any given time by at least 26,000; and the number of workers suffering from Grade 2 byssinosis at any given time would be reduced by at least 10,000. A comparable reduction in the incidence of chronic obstructive pulmonary disease would follow. See *supra* at 11.

The standard would thus substantially diminish the significant health risk faced by cotton textile workers.

2. *The Most Protective Standard.* ATMI does not contend that the Secretary failed to adopt the "most pro-

tective" standard. Rather, the contention is that at the rulemaking proceeding ATMI and individual cotton textile companies proposed an "alternative" compliance scheme, which they claimed would provide cotton textile workers health protection "not significantly" less than that afforded by the Secretary's final standard and at a much lower cost. ATMI Br. 10-12. ATMI challenges the Secretary's decision not to adopt that alternative. *Id.* at 48.

If the Secretary were faced with two possible compliance schemes of equivalent efficacy, one of which is less expensive than the other, both reason and the statute point toward the lower cost option. That is not the situation here. The ATMI alternative in fact falls far short of offering health protection equivalent to that of the regulatory approach adopted by the Secretary.

Under ATMI's proposal [66] all employers in the cotton textile industry would be permitted to continue to expose their workers to levels of cotton dust at least as high as those permitted under the prior federal standard.[67] A worker exposed to those high dust concentrations would be afforded no health protection of any type until his employer was satisfied that the individual had already contracted byssinosis. That determination would be made on the basis of a medical surveillance program under which a worker would be considered to have contracted byssinosis only if it were clear, from both pulmonary function tests [68] and the worker's responses to a company-administered questionnaire, that such a diagnosis was required. Ex. 160 at 22-28 (App. 381-383).

---

[66] ATMI's proposal is described in its post-hearing brief to the agency, Ex. 160 at 14-29 (App. 372-384).

[67] In the operations of opening through spinning, ATMI called for a PEL of 500 ug/m^3, a level equivalent to the prior federal standard. See note 14, *supra*. In weaving operations, ATMI urged that the PEL be raised to 1000 ug/m^3, a level substantially higher than that permitted by the existing standard. See note 18, *supra*.

[68] See note 8, *supra*.

Each worker so identified would be "issued and required to wear a respirator, without regard to the [dust] levels to which he or she may be exposed." *Id.* at 28 (App. 383). After a period of time, further pulmonary function tests would be administered by the company and, if the worker continued to exhibit significant loss of lung function, he would be examined by a physician. *Ibid.* Consideration would then be given to the question whether the affected worker should be transferred to a job with a lower exposure level. In this regard, ATMI stated in its submission to the Secretary:

> It must be emphasized that such transfer should be effected only with the employee's agreement and only after consideration is given to a multitude of factors, including age, length of employment in the present area, and the extent of decline or decrement in lung function. *Ibid.*

Even after this sequence of events, if a company entertained any doubt whether a worker's impaired health resulted from exposure to cotton dust, no transfer would be offered. *Id.* at 28-29 (App. 383).

The underlying premise of ATMI's alternative is that workers should be afforded no protection from the acute health effects of byssinosis and that the standard's sole health objective should be to reduce the incidence of chronic obstructive pulmonary disease. But, as the Secretary found, the acute effects of byssinosis are "significant . . . in themselves and should be prevented insofar as possible." 43 Fed. Reg. 27354, col. 2. Under ATMI's approach, at any given time as many as 26,000 textile workers would suffer acute respiratory ailments that could have been prevented by reducing exposure levels as required by the Secretary's standard. Of that number, as many as 10,000 would suffer Grade 2 byssinosis. See *supra* at 11. No medical surveillance program can assure that the disease will be identified prior to Grade 2. As Dr. Merchant testified, "one could miss true *grade 2* byssinosis with a medical surveillance pro-

gram that is competent, is professional, well run." Tr. 1137 (App. 439) (emphasis added).[69] In large part, this is because there is no orderly progression from one grade of byssinosis to another. See pp. 4-5, *supra*.

At least by Grade 2, acute byssinosis constitutes a "material impairment of health or functional capacity" within the meaning of § 6(b)(5). And while it is not necessary to our point, or to the validity of the standard, we note that the record supports the conclusion that the lower grades of byssinosis also constitute such an impairment. Indeed, while ATMI disputes this conclusion

---

[69] In this regard, the deficiencies in ATMI's approach are compounded by the fact that detection of byssinosis depends in large part on the symptoms an employee reports in response to a standard questionnaire. Experience with this procedure has shown that workers often do not disclose health impairments to their employers "especially . . . when [they] fear that forced transfer or early retirement might flow from [such disclosure]." 43 Fed. Reg. 27359, col. 2. See also Tr. 1039 (App. 436) (Dr. Merchant); Ex. 6, No. 24 at 265 (App. 24) (Dr. Bouhuys).

Further, under ATMI's proposal, a worker would be afforded no protection from exposure to cotton dust unless a company doctor determined that protection was necessary for that individual. But the record demonstrates that doctors associated with the industry have been exceedingly reluctant to diagnose workers as suffering from byssinosis. See e.g., Tr. 2148-50 (App. 455-456) (Willie Baldwin); Statement of Eva Bradshaw (Ex. 54) at 1-2 (App. 208-210); Statement of Elsie Morrison (Ex. 54) at 1-2 (App. 210-212); Statement of William Tyndall (Ex. 54) at 1 (App. 215-216); Ex. 54A at 14 (App. 219) (Carolina Brown Lung Ass'n); Tr. 2143-46 (App. 454-455) (Charles Hassell). Compare Ex. 48 at 3-9 (App. 203-207) (Statement of Dr. M. C. Battagelli) with 43 Fed. Reg. 27353, cols. 1-2. In part, this may be a reflection of the attitude harbored by some of those doctors that "byssinosis itself, grades ½, 1 and 2 . . . really doesn't constitute much of a disease" [Tr. 1604 (App. 445) (Dr. Russell Harley)]—an attitude which the Secretary found to be outmoded and simply wrong on the basis of the record evidence. The reluctance of company doctors to diagnose a worker as suffering from cotton dust-induced lung disease may also reflect the fact that such a diagnosis could subject a company to workers' compensation liability. Ex. 82 at 12 (App. 323).

as to Grade ½ byssinosis, its brief is conspicuously silent on this point with regard to Grade 1 and above. ATMI Br. 4-5.

Accordingly, because the ATMI alternative tolerates subjecting large numbers of cotton textile workers, who would be protected by the Secretary's standard, to acute byssinosis, including Grade 2 byssinosis, the proposal is, at the threshold, significantly less protective than the standard.

The "industry alternative" is likewise inadequate as a means of reducing the prevalence of chronic obstructive pulmonary disease. ATMI promises that its scheme, while admittedly ignoring the acute stages of byssinosis, would "protect[] against any risk of disabling or irreversible lung damage . . ." ATMI Br. 11-12. The facts are to the contrary. As noted above, there is no orderly progression from one grade of byssinosis to another. The point at which the chronic stage is contracted varies from individual to individual.[70] Medical surveillance cannot therefore ensure timely identification of the disease before the irreversible stage is reached.

Moreover, even if employers were able to *identify* workers with byssinosis before those workers have chronic obstructive pulmonary disease, ATMI's proposal would not protect those identified. ATMI posits that workers who have contracted the acute forms of byssinosis "could then be protected . . . by selective use of respirators or transfer to low exposure areas, as medically appropriate for the individual concerned." ATMI Br. 11-12. As the Secretary found, however, respirators cannot serve as a long-term solution to worker exposure to cotton dust. Workers wearing respirators must exert additional effort in order to breathe. Workers already suffering from reduced breathing capacity—including by definition those with byssinosis—generally cannot tolerate this added bur-

---

[70] See pp. 4-5, *supra*.

den. 43 Fed. Reg. 27384, col. 3.[71] Yet ATMI's "solution" would be to provide respirators precisely to the workers who cannot use them. Moreover, it is difficult to fit a respirator properly, and there is no satisfactory method for determining when a proper fit has been achieved; as a result, there can be no assurance that a respirator is actually working. 43 Fed. Reg. 27384, col. 3.[72] Finally, while respirators provide questionable worker protection, they create additional hazards "by interfering with vision, hearing and mobility" and the ability to communicate. 43 Fed. Reg. 27384, col. 3.[73]

Apart from respirators the only control measure incorporated in the ATMI alternative is that mills would provide opportunities, on a selective basis, for workers to transfer to low exposure areas when deemed appropriate by their employer. This aspect of ATMI's proposal

---

[71] See Tr. 1326 (App. 442) (Dr. Baier); Ex. 80a at 6-7 (App. 312-315) (Prof. Burgess); Ex. 82 at 4, 8 (App. 317-318, 321) (ACTWU); Ex. 54A at 11 (App. 217) (Carolina Brown Lung Ass'n); Tr. 2132-33 (App. 453) (employee Vernon Sandlin); Tr. 3015-16 (App. 482-483) (employee Frank Davis). Indeed, the record shows that even for individuals not already impaired, the physical demands of wearing a respirator are such that workers cannot use them on a long term basis; even where exposure to the most dangerous toxic substances is concerned, respirator usage for more than a few hours at a time is unheard of in American industry. Tr. 1325-28 (App. 441-444) (Drs. Baier and Schutz); Tr. 2999-3000, 3010 (App. 481-482) (Prof. Burgess); Tr. 501 (App. 413-414) (Bruce Held); Ex. 80a at 5 (App. 311-312) (Prof. Burgess).

[72] See Ex. 80a at 2-5 (App. 309-311) (Prof. Burgess); Ex. 15 at 2 (App. 165) (Bruce Held); Ex. 82 at 3-4, 8 (App. 317, 321) (ACTWU); Ex. 54A at 11 (App. 217) (Carolina Brown Lung Ass'n); Tr. 3040-41 (App. 484) (Eric Frumin); Tr. 1326-27 (App. 443) (Dr. Baier); Tr. 3016 (App. 483) (employee Frank Davis). The inability to obtain a proper facial fit is particularly a problem for female employees, who constitute a significant percentage of the workforce in the cotton textile industry. Tr. 3040-41 (App. 484) (Eric Frumin).

[73] See, e.g., Ex. 15 at 2 (App. 165-166) (Bruce Held); Tr. 3018 (App. 483-484) (employee Alvah Mabe).

necessarily rests on the premise that the number of workers to be transferred would be "manageable." Ex. 6, No. 57 at 3-5 (App. 58-60) (Dr. Imbus).[74] But at the industry-proposed PEL one out of four textile workers would have acute byssinosis. The many thousands of employees who would have to be transferred would not on industry's own estimate be "manageable".

Even if a sufficient number of transfer opportunities could be made available, ATMI's approach is inadequate. Dr. Merchant testified, on the basis of his knowledge of both the textile and coal mining industries, that if such transfers were offered, many workers would be precluded from accepting the offer by the attendant loss of earnings or other adverse employment consequences. Tr. 1139-40 (App. 441). Those workers would be required by financial compulsion to remain exposed to the unsafe dust levels that had already impaired their health. On the other hand, each employee who did transfer to a job with a lower level of exposure would have to be replaced. Each replacement, in turn, would be subjected to the high dust levels that caused his predecessor to contract byssinosis. Thus in the name of OSHA compliance, ATMI's program is likely to result in increasing the number of workers who contract acute byssinosis.

In short, ATMI's alternative offers only an illusion of worker protection,[75] rather than the reality OSHA

---

[74] ATMI itself recognized the inherent limitations of any transfer program, stating that, at most, ten (10) percent of the employees in a mill could be transferred. Ex. 60 at 57 (App. 384-385) (ATMI Comments); Tr. 1881-82 (App. 445-446) (Dr. Imbus).

[75] ATMI's chief witness stated that while

> [s]ome may feel that a medical surveillance program [including the use of respirators and transfers] will be an economical alternative for institution of dust control[,] I cannot subscribe to [that] position. * * * Medical surveillance programs are not a substitute for diligent efforts to control dust. [Ex. 6, No. 57 at 2, 11]

ATMI maintains, however, that the effectiveness of its alternative was "demonstrated" by the surveys submitted by ATMI and sev-

demands. In *Whirlpool Corp.* v. *Marshall*, 445 U.S. 1, 11-12 (1980), the Court stated:

> The Act, in its preamble, declares that its purpose and policy is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources . . ."
>
> * * * *
>
> To accomplish this basic purpose the legislation's remedial orientation is prophylactic in nature. . . . The Act does not wait for an employee to die or become injured. It authorizes the promulgation of health and safety standards and the issuance of citations in the hope that these will act to prevent deaths or injuries from ever occurring.

---

eral member companies regarding the prevalence of byssinosis at certain mills where various medical surveillance programs including the use of respirators and transfers had been in effect (ATMI Br. 10-11). As has been noted, the Secretary found that these surveys were not reliable. See p. 7, note 11, *supra*. But even if the results of the surveys were accepted at face value, they would lend no support to ATMI's proposal. For dust levels at the mills in question were well below the level of 500 ug/m^3 which ATMI proposes. For example, the Secretary noted that the survey conducted by Dr. Hans Weill had been commissioned by ATMI precisely for the purpose of evaluating the prevalence of byssinosis at "mills with very low doses." 43 Fed. Reg. 27355, col. 3. Dr. Weill stated that the mills he studied "undoubtedly represent the best environmental dust control in the industry" Ex. 13a at 2 (App. 158). Similarly, in the mills surveyed by Dr. Harold Imbus of Burlington Industries, 66% of the exposure levels were below 500 ug/m^3 (43 Fed. Reg. 27359, col. 2); indeed, Dr. Imbus attributed the reduction of byssinosis prevalence in those mills primarily to a reduction of dust levels. Tr. 1894-97 (App. 447-448). And in the survey of Dr. W.K.C. Morgan, "some 90-plus percent of the people . . . [were] exposed at [300 ug/m^3] or [200 ug/m^3] or even below [200 ug/m^3]." Tr. 1904-09 (App. 448-449). As the Secretary concluded, given these low dust levels the industry surveys shed no light on what would be the consequences of the much higher PEL proposed by ATMI. "It is not surprising . . . that data gathered from a worker population which has enjoyed conditions approaching those mandated . . . by this final standard show a marked improvement in worker health." 43 Fed. Reg. 27359, col. 2.

This "overriding purpose of the Act" (*id.* at 11), makes it plain that the alternative adopted by the Secretary, not the ATMI alternative, is the "most protective" standard—the standard demanded by Congress.

3. *Feasibility.* In this Court, the industry does not dispute the technological feasibility of the standard. See *supra* at 14. As to economic feasibility, the Secretary's estimate that the total cost of compliance with the standard would be approximately $550 million is supported by the record.[76] The RTI analysis of the industry's ability to finance the cost of compliance with the standard, on which the Secretary relied, showed that at cost estimates twice as high as $550 million "the cotton textile industry as a whole [would not] be seriously threatened." See *supra* at 19. For the "much less severe" actual cost requirements of the standard, the Secretary concluded "that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation." See *supra* at 19.

As we have seen (*supra* at 35-39), Congress in enacting OSHA was aware that the cost of compliance with occupational health standards would threaten the viability of marginal employers. But Congress determined that the level of worker protection is not to be determined by the lowest common denominator of economic ability to comply. To the contrary, Congress refused to dilute the mandated level of worker protection to meet the economic needs of marginal employers. Instead, the legislative solution was to establish a loan program to assist small businesses in achieving compliance with standards promulgated by the Secretary. See *supra* at 38-39.

---

[76] As we have discussed in detail, the only dispute as to the Secretary's cost estimate concerns his conclusion that the cost of compliance in the 25% of the *spinning* operations where exposure levels were in excess of 200 ug/m^3 at the time of the rulemaking would be $17.7 million. See *supra* at 15. The Secretary's conclusion is amply supported by the record. See *supra* at 16-18.

In the provisions at issue here, as in the statute considered in *National Crushed Stone, supra,*

> Congress foresaw and accepted the economic hardship, including the closing of some plants, that [regulation] would cause; and Congress . . . took certain steps to alleviate this hardship, steps which did not include allowing a . . . [relaxation of the appropriate protective standards]. [Sl. Op. 14.]

II. THE ACT AUTHORIZES THE SECRETARY TO REQUIRE EARNINGS PROTECTION FOR WORKERS WHO MUST BE TRANSFERRED TO AVOID EXCESS EXPOSURE TO COTTON DUST

Due to an anticipated shortage of the dust control equipment needed to meet the standard's PELs, the Secretary granted industry a four-year period in which to put those controls in place. *Supra,* p. 12. And the Secretary recognized that there would undoubtedly be some mills that would not come into compliance with the PELs even then. To provide at least some measure of protection, the Secretary mandated the interim use of respirators. 29 C.F.R. § 1910.1043(f)(1). The Secretary recognized also that certain workers are physically unable to wear respirators and concluded that their health could only be protected by affording them an opportunity to transfer to jobs with lower exposure levels. In this connection, the record showed that if workers were forced to take a cut in pay in order to transfer, many would be compelled by economic necessity to decline a transfer opportunity. *Supra,* p. 48. Accordingly, the standard provides:

> Whenever a physician determines that an employee is unable to wear any form of respirator, . . . the employee shall be given the opportunity to transfer to another position which is available or which later becomes available having a dust level at or below the PEL. [29 C.F.R. § 1910.1043(f)(2)(v).]

The Secretary further required that:

> The employer shall assure that an employee who is [so] transferred . . . suffers no loss of earnings or other employment rights or benefits as a result of the transfer. [*Ibid.*]

Thus, the costs associated with these transfers, like those associated with the other control measures prescribed by the standard (e.g., engineering controls and respirators), are to be borne by the employer.

ATMI does not challenge the Secretary's authority to require employers to provide workers a transfer opportunity as a means of preventing excessive exposure to a health hazard.[77] ATMI does raise, however, the "relatively narrow question" whether the Secretary has "authority to require employers to maintain the earnings . . . of employees who are [so] transferred . . ." (ATMI Br. 52).

ATMI first argues that since the statute does not *in haec verba* grant the Secretary authority to impose a "wage guarantee provision" (ATMI Br. 53), this provision of the standard should be invalidated. But the challenged provision falls well within the terms of § 6(b)(7), which authorizes the Secretary "[w]here appropriate [to] prescribe suitable . . . control procedures to be used in connection with [occupational health] hazards. . . ." Further, as mentioned, § 3(8) defines an "occupational safety and health standard" in broad terms to include "the adoption or use of one or more practices, means, methods, operations or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." Thus Congress chose not to prescribe a list of

> specific 'do's and don't's' for keeping workplaces safe and healthful. Industrial safety and health

---

[77] Indeed, given ATMI's proposed "alternative" (see pp. 47-48, *supra*) which relies significantly on worker transfers, ATMI could hardly argue that the statute forbids the Secretary to include such a provision in his compliance program.

problems are as complex and changing as American industry itself. They cannot be solved by a lengthy list of prohibitions spelled out in a statute.

Instead, the [Act sets] up a legal structure; that is, it . . . empower[s] an administrative agency to issue detailed safety and health regulations. . . . [Leg. Hist. 297-298 (analysis of Senator Saxbe).][78]

---

[78] ATMI notes (Br. 56) that under the Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C. § 801-960, Congress guaranteed miners with pneumoconiosis the option of transferring to lower exposure levels in the mine without any attendant loss of pay. According to ATMI, the absence of any comparable express provision in OSHA evidences a legislative intent to foreclose the Secretary from imposing a similar requirement when fashioning OSHA standards. ATMI, however, overlooks a basic distinction. In the Coal Mine Health and Safety Act Congress drafted legislation for a single industry, prescribing in great detail a comprehensive program of control measures mandated to meet the particular health hazards of coal mining. 30 U.S.C. § 801-878. These provisions addressed such highly particularized matters as the precise PELS to be met (*id.* § 842(b); see also § 843(b)), the specifications of ventilation equipment to be installed (*id.* § 863), and the type of dust measuring device to be used ("the gravametric dust sampler with four channel horizontal elutriator developed by the Mining Research Establishment of the National Coal Board, London, England," *id.* § 842(e) (as originally enacted, P.L. 91-173, Title II, § 202 (1969)).

In OSHA, by marked contrast, Congress was legislating with respect to:

> every employer whose business affects interstate commerce. Eschewing any attempt to establish substantive provisions to control all these various employers, the Act creates a general framework to govern the development of regulations, and delegates the task of formulating particular health and safety standards to the Secretary. . . . [*Industrial Union Department* v. *Hodgson*, 499 F.2d 467, 499 (D.C. Cir. 1974).]

The lesson, if any, to be drawn from the Coal Mine Health and Safety Act is that in the one statute where Congress directly addressed the question, it concluded that if worker transfers are to be relied upon as a means of providing health protection, an income-protection provision is necessary. See *Whirlpool Corp.* v. *Marshall*, *supra*, 445 U.S. at 13, n. 18.

Given this statutory framework, ATMI's argument proves too much and therefore proves nothing. For §§ 6 (b) (7) & 3(8) do not expressly provide that the Secretary can require employers to bear the cost of respirators, medical surveillance or any other control methods. Yet, ATMI does not challenge the Secretary's authority to impose those obligations through this standard. For it is manifest that Congress expected the costs of controlling occupational hazards to be placed upon employers. Congress viewed these as "reasonable and necessary costs of doing business." Leg. Hist. 1150-51 (Sen. Eagleton) See generally *supra*, pp. 35-39. And, so far as we are able to discern, or ATMI informs us, there is no distinction between the costs associated with the particular control measure here involved—*viz.*, worker transfers—and the costs of respirators or any other control measure.[79]

Finally, contrary to ATMI's assertion (Br. 55), the Congressional decision not to include a "strike with pay" provision in the Act is of no relevance to the issue at hand. This Court explained in *Whirlpool*, *supra*, that:

> . . . What primarily troubled Congress about the Daniels' bill's 'strike with pay' provision was its requirement that employees be paid their regular salary after . . . refus[ing]to work. . . . [445 U.S. at 17].

---

[79] ATMI also complains that under the standard workers who are exposed on the job to excessive levels of cotton dust and who cannot wear respirators must be offered transfers to other jobs in lower exposure areas "without any demonstration that they are suffering a work-related health impairment or even that their inability to wear respirators is related to exposure to cotton dust . . ." (ATMI Br. 52). But the purpose of this control measure, like any other, is preventive: "The Act does not wait for an employee to die or become injured. It authorizes the promulgation of health and safety standards . . . in the hope that these will act to prevent deaths or injuries from ever occurring." *Whirlpool Corp.* v. *Marshall, supra*, 445 U.S. at 12.

Senator Williams explained that the bill would have enabled workers "to walk off the job with full pay." Leg. Hist. 416. See also *id.* at 1011 (Rep. Randall), 1046 (Rep. Feighan), and 1089 (Rep. Horton).

Here, however, there is no "strike". Rather, the transfer provision will come into play only if a doctor has certified that a worker exposed to cotton dust levels above the PEL is physically incapable of wearing a respirator. At that juncture, a transfer to an available job with lower exposure levels must be offered *not* because the worker has "refused to work" but because the Secretary has determined that, in these circumstances, transfer constitutes the only remaining means of protecting the worker's health. Once the transfer is effected, the worker is paid for working, not for remaining away from work.

CONCLUSION

For the foregoing reasons, the judgment of the court of appeals should be affirmed.

Respectfully submitted,

J. ALBERT WOLL
General Counsel, AFL-CIO
815 15th Street, N.W.
Washington, D.C. 20005

ELLIOT BREDHOFF
General Counsel
Industrial Union Department, AFL-CIO
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036

ARTHUR M. GOLDBERG
General Counsel
Amalgamated Clothing & Textile Workers Union
15 Union Square
New York, New York 10003

Of Counsel

GEORGE H. COHEN*
ROBERT M. WEINBERG
JEREMIAH A. COLLINS
BREDHOFF, GOTTESMAN, COHEN, CHANIN, WEINBERG & PETRAMALO
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 833-9340
* Counsel of Record

LAURENCE GOLD
815 16th Street, N.W.
Washington, D.C. 20006

Attorneys for American Federation of Labor and Congress of Industrial Organizations, Industrial Union Department, AFL-CIO, and Amalgamated Clothing & Textile Workers Union, AFL-CIO

APPENDIX A

APPENDIX A

In addition to the sections of the Occupational Safety and Health Act of 1970, P.L. 91-596, 84 Stat. 1590, 29 U.S.C. § 651 *et seq.*, which are set forth in the Appendix to Petitioner ATMI's brief, the following sections of the Act are also pertinent:

Section 6(b)(6)(A), 29 U.S.C. § 655(b)(6)(A), provides in pertinent part:

> Any employer may apply to the Secretary for a temporary order granting a variance from a standard or any provisions thereof promulgated under this section.

Section 6(b)(7), 29 U.S.C. § 655(b)(7), provides in pertinent part:

> Any standard promulgated under this subsection shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatment, and proper conditions and precautions of safe use or exposure. Where appropriate, such standard shall also prescribe suitable protective equipment and control or technological procedures to be used in connection with such hazards and shall provide for monitoring or measuring employee exposure at such locations and intervals, and in such manner as may be necessary for the protection of employees.

Section 6(b)(8), 29 U.S.C. § 655(b)(8) provides:

> Whenever a rule promulgated by the Secretary differs substantially from an existing national consensus standard, the Secretary shall, at the same time, publish in the Federal Register a statement of the reasons why the rule

as adopted will better effectuate the purposes of this Act than the national consensus standard.

Section 7(b) of the Small Business Act, 15 U.S.C. § 636(b)(5), as amended by § 28 of the Occupational Safety and Health Act, provides in pertinent part:

> The [Small Business] Administration also is empowered—
>
> * * * *
>
> to make such loans (either directly or in cooperation with banks or other lending institutions through agreements to participate on an immediate or deferred basis) as the Administration may determine to be necessary or appropriate to assist any small business concern in effecting additions to or alterations in the equipment, facilities, or methods of operation of such business in order to comply with the applicable standards promulgated pursuant to section 6 of the Occupational Safety and Health Act of 1970 or standards adopted by a State pursuant to a plan approved under section 18 of the Occupational Safety and Health Act of 1970, if the Administration determines that such concern is likely to suffer substantial economic injury without assistance under this paragraph.

APPENDIX B

APPENDIX B

A Survey of Statutory Approaches to the Consideration of Costs and Benefits in the Promulgation of Health and Safety Regulations

Balancing of costs and benefits is expressly required by several regulatory statutes. An early example is the Flood Control Act of 1936, 33 U.S.C. § 701a: "[T]he Federal Government should improve or participate in the improvement of navigable waters . . . for flood-control purposes if the benefits to whomsoever they accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected." More recent examples include the Outer Continental Shelf Lands Act Amendments of 1978, 43 U.S.C. § 1347(b), which provide that offshore drilling operations shall use "the best available and safest technologies which the Secretary determines to be economically feasible, . . . except where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies." (Plainly, in drafting that statute Congress did not regard the term "economically feasible" as including the concept of cost-benefit balancing; rather, additional language was inserted to incorporate that concept.) The Energy Policy and Conservation Act of 1975, as amended, 42 U.S.C. § 6295(c), (d), provides that in promulgating energy efficiency standards "the Secretary . . . shall determine that the benefits of the standard exceed its burdens based, to the greatest extent practicable, on a weighing of [several specified] factors. . . ."

In several instances, Congress has required some form of cost-benefit balancing with respect to the promulgation of certain regulations under a statute, while requiring other regulations under the same statute to be developed without regard to any such balancing, albeit with some consideration of costs. A good example is the Federal Water Pollution Control Act Amendments of 1972, as amended, 33 U.S.C. § 1251 *et seq.*

That statute specifies that in setting effluent limitations to be achieved by 1977, the Environmental Protection Agency ("EPA") is to require the use of the "best practicable control technology currently available (§ 1311 (b) (1)), and the statute further provides that EPA's "assessment of [that] technology shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from that application. . . ." (§ 1314(b) (1) (B)). The latter requirement entails a "limited cost-benefit analysis"—a "balancing test between total cost and effluent reduction benefits [which] is intended to limit the application of technology only where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction. . . ." 118 Cong. Rec. 33696 (1972), discussed in *EPA* v. *National Crushed Stone Assn.*, No. 79-770, Sl. Op. 6, n. 10; *id.* at 10-12.

On the other hand, the 1972 Amendments provide that effluent limitations to be attained by 1973 * should be based on "the best available technology economically achievable" (as amended, § 1311(b) (2) (A)), and under that provision, while costs are to be considered, "no balancing test will be required." 118 Cong. Rec. 33696 (1972). See *EPA* v. *National Crushed Stone Assn.*, *supra*, Sl. Op. 6, n. 10; *Weyerhaeuser Corp.* v. *Costle*, 590 F.2d 1011, 1044-46 (D.C. Cir. 1978).

The amendments also authorize EPA to set more stringent effluent limitations for particular sources of pollution where the generally mandated levels will not achieve the required standard of water quality in a particular setting; but before so doing the Administrator must conduct a public hearing to assess the "economic and social" costs and benefits involved (33 U.S.C. § 1312(b) (1)), and the more stringent limitations cannot be applied against

---

* This deadline has been extended to 1987 by the Clean Water Act Amendments of 1977. See *id.*, Sl. Op. 5, n. 9.

any person who demonstrates at that hearing that "there is no reasonable relationship between the economic and social costs and the benefits to be obtained. . . ." 33 U.S.C. § 1312(b)(2).

Similarly, the Clean Water Act Amendments of 1977, 33 U.S.C. § 1251 *et seq.*, which established new criteria for the regulation of "conventional pollutants," require that in setting effluent limitations for such substances EPA shall consider "the reasonableness of the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived. . . ." 33 U.S.C. § 1314(b)(4)(B).

Another statute which requires cost-benefit evaluations for some regulations but not for others is the Clean Air Act Amendments of 1970, as amended, 42 U.S.C. § 7401 *et seq.*, which were passed the same week as OSHA. In that statute, the provision which authorizes EPA to prohibit the manufacture or sale of a fuel or fuel additive that significantly impairs an emission control device expressly requires EPA to perform "a cost benefit analysis" (42 U.S.C. § 7545(c)(2)(B)), while the provision which authorizes the prohibition of a fuel or additive that would "endanger the public health or welfare" does not contain such a requirement (42 U.S.C. § 7545(c)(2)(A)).

A particular form of cost-benefit balancing has also been adopted by Congress in the several statutes which are based on the concept of "unreasonable risk," each of which involves the regulation of particular types of products.

One of the first "unreasonable risk" provisions is contained in the National Traffic and Motor Vehicle Safety Act of 1966, as amended, 15 U.S.C. § 1391(1). "As the Senate hearings make clear, the word 'unreasonable' was placed in the bill deliberately, to signify a 'common-sense' balancing of safety benefits and economic cost." *United States* v. *General Motors Corp.*, 518 F.2d 420,

435 (D.C. Cir. 1975). See S. Rep. No. 89-1301, 89th Cong., 2d Sess. 6 (1966).

The year before OSHA was enacted, Congress incorporated an "unreasonable risk" requirement in the Child Protection and Toy Safety Act of 1969, as amended, 15 U.S.C. § 1261(s). The provision was included so as to require consideration of "such factors as the utility of the object, the degree of danger it presents, and the feasibility of designing out that danger." S. Rep. No. 91-237, 91st Cong., 1st Sess. 7 (1969). See generally *Forester* v. *CPSC*, 559 F.2d 774, 789 (D.C. Cir. 1977).

Two years after OSHA was enacted, Congress adopted an "unreasonable risk" requirement in two more statutes. In incorporating that concept in the Consumer Product Safety Act of 1972,* Congress stated:

> Protection against unreasonable risks is central to many Federal and State safety statutes and the courts have had broad experience in interpreting the term's meaning and application. It is generally expected that the determination of unreasonable hazard will involve the Commission in balancing the probability that risk will result in harm and the gravity of such harm against the effect on the product's utility, cost and availability to the consumer.

H.R. Rep. No. 92-1153, 92d Cong., 2d Sess. 33 (1972). See also S. Rep. No. 92-749, 92d Cong., 2d Sess. 6, 14-15 (1972). Similarly, in the Federal Environmental Pesticide Control Act of 1972, as amended, 7 U.S.C. § 136(bb), Congress defined the term "unreasonable adverse effects on the environment" to mean "an unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide." The EPA may regulate a pesticide only to the extent that the pesticide entails such "unreasonable adverse effects." See 7 U.S.C. §§ 136

---

* See 15 U.S.C. §§ 2056(a), 2058(c)(1)(A),(C), 2058(c)(2)(A).

a(c)(5)(C), (D), 136a(c)(7), (8), 136a(d), 136d(b). This explicitly requires a balancing of costs and benefits. See *Environmental Defense Fund* v. *EPA*, 548 F.2d 998, 1005 (D.C. Cir. 1976).

Recently, Congress enacted yet another statute based on the concept of "unreasonable risk" and explicitly requiring a balancing of costs and benefits: the Toxic Substances Control Act of 1976, 15 U.S.C. § 2605(a), (c)(1).

Finally, the provisions of the Federal Food, Drug, and Cosmetic Act concerning human and animal drugs, 21 U.S.C. §§ 321(p)(1), 360b, illustrate an altogether different approach to the consideration of costs and benefits. In determining whether a human drug is "safe" the Food and Drug Administration ("FDA") must assess whether "the expected therapeutic gain [from the drug] justifies the risk entailed by its use." *United States* v. *Rutherford*, 442 U.S. 544, 555 (1979). That is to say, a drug is "safe" only if its curative benefits outweigh its side effects. But while the statute requires a balancing of *therapeutic* costs and benefits, it does not contemplate a balancing of *economic* costs and benefits. See Decision of the Commissioner in the Matter of Diethylstilbestrol: Withdrawal of Approval of New Animal Drug Applications, 44 Fed. Reg. 54852, 54881-54883 (Sept. 21, 1979). On the other hand, the provisions of the Food, Drug, and Cosmetic Act which authorize FDA to set "tolerances" for certain hazardous substances (e.g., 21 U.S.C. §§ 346, 346a, 348(c)(4)(A), (B)) may contemplate some form of economic cost-benefit balancing. *Id.* at 54881-54882.

FILED
JAN 14 1981
MICHAEL RODAK, JR., CLERK

No. 79-1429
(Consolidated with No. 79-1583)

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

REPLY BRIEF FOR PETITIONERS

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART AND EDWARDS
First National Bank Tower
Two Peachtree Street, N.W.
Atlanta, Georgia 30383

NEIL J. KING
Counsel of Record
A. STEPHEN HUT, JR.
ANDREW N. VOLLMER
WILMER & PICKERING
1666 K Street, N.W.
Washington, D.C. 20006
(202) 872-6000

Counsel for American Textile Manufacturers Institute, Inc.

[Counsel for other Petitioners are listed on inside cover]

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Milliken and Company

JOSEPH K. MADDOX, JR.
P.O. Box 5784
Spartanburg, S.C. 29304

Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Hermitage, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
BAKER & HOSTETLER
818 Connecticut Ave., N.W.
Washington, D.C. 20006

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
Greensboro, N.C. 27405

Counsel for Cone Mills Corporation

DAN M. BYRD, JR.
J. SPRATT WHITE
P.O. Box 70
Fort Mill, S.C. 29715

Counsel for Springs Mills, Inc.

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

Counsel for Fieldcrest Mills, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Arkwright Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Blair Mills, Inc.

HARLAN H. HUNTLEY
ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541

Counsel for Dan River, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Mayfair Mills

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
CONSTANGY, BROOKS & SMITH
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P.O. Box 71
West Point, Georgia 31833

Counsel for West Point-Pepperell, Inc.

January 14, 1981

TABLE OF CONTENTS

	Page
I. OSHA STILL HAS NOT ARTICULATED ANY MEANINGFUL OR EFFECTIVE COST-RELATED LIMITATIONS UPON ITS STANDARD-SETTING AUTHORITY	1
II. DETERMINING WHETHER A REASONABLE RELATIONSHIP EXISTS BETWEEN THE COSTS AND BENEFITS OF A STANDARD IS BOTH CONSISTENT WITH CONGRESSIONAL INTENT AND WITHIN THE AGENCY'S COMPETENCE	8
III. OSHA DID NOT MAKE A SUPPORTABLE FINDING THAT THE COSTS OF THE STANDARD BEAR A REASONABLE RELATIONSHIP TO THE EXPECTED BENEFITS OR EVEN THAT THE COSTS WOULD BE "AFFORDABLE"	16
A. The Assessment of Costs	17
B. The Assessment of Health Benefits	24
CONCLUSION	29

TABLE OF AUTHORITIES

Cases: Page

A.L.A. Schechter Poultry Corp. v. United States, 295 U.S. 495 (1935) 7

AFL-CIO v. Marshall, 617 F.2d 636 (D.C. Cir. 1979) 27

Amalgamated Meat Cutters & Butcher Workmen v. Connally, 337 F. Supp. 737 (D.D.C. 1971) 7

American Petroleum Institute v. OSHA, Nos. 80-3018, *et al.* (5th Cir.) 7

Burlington Truck Lines, Inc. v. United States, 371 U.S. 156 (1962) 20

Citizens To Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402 (1971) 7

EPA v. National Crushed Stone Association, 49 U.S.L.W. 4008 (U.S. Dec. 2, 1980) 12, 15, 16

Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976) 6

FPC v. Texaco Inc., 417 U.S. 380 (1974) 17

Industrial Union Department, AFL-CIO v. Hodgson, 499 F.2d 467 (D.C. Cir. 1974) 11

Industrial Union Department, AFL-CIO v. American Petroleum Institute, 48 U.S.L.W. 5022 (U.S. July 2, 1980) ..... *passim*

Lubrizol Corp. v. EPA, 562 F.2d 807 (D.C. Cir. 1977) 7

RMI Co. v. Secretary of Labor, 594 F.2d 566 (6th Cir. 1979) 11, 12

SEC v. Chenery Corp., 332 U.S. 194 (1947) 17

Texas Independent Ginners Association v. Marshall, 630 F.2d 398 (5th Cir. 1980) 12

Turner Co. v. Secretary of Labor, 561 F.2d 82 (7th Cir. 1977) 11, 12

Whirlpool Corp. v. Marshall, 445 U.S. 1 (1980) 8

Administrative Decisions and Reports:

Continental Can Co., [1976-1977] OSH Dec. (CCH) 25250, 4 OSH Cas. (BNA) 1541 (1976) .. 12

TABLE OF AUTHORITIES—Continued

Statutory Provisions:	Page
Clean Air Act	
§ 112, 42 U.S.C. § 7412 (Supp. III 1979)	14
Consumer Product Safety Act	
§ 9(c), 15 U.S.C. § 2058(c) (1976)	12, 13
Occupational Safety and Health Act of 1970	
§ 2(b), 29 U.S.C. § 651(b) (1976)	10
§ 3(8), 29 U.S.C. § 652(8) (1976)	10, 14
§ 6(b)(5), 29 U.S.C. § 655(b)(5) (1976)	*passim*
§ 6(b)(6)(A), 29 U.S.C. § 655(b)(6)(A) (1976)	15
5 U.S.C. § 706(2)(C) (1976)	7
30 U.S.C. § 843(b)(3) (1976)	8
33 U.S.C. §§ 1251 *et seq.* (1976)	14
Administrative Regulations:	
29 C.F.R. § 1910.1043(f)(2)(v) (1979)	8
41 Fed. Reg. 56498 (1976)	28
43 Fed. Reg. 27350 (1978)	*passim*
45 Fed. Reg. 5001 (1980)	7
45 Fed. Reg. 83448 (Dec. 18, 1980)	14
45 Fed. Reg. 85772 (Dec. 20, 1980)	13
Miscellaneous:	
McGowan, *Congress, Court, and Control of Delegated Power*, 77 Colum. L. Rev. 1119 (1977)	6
OSHA News Release	27
Statement of Environmental Protection Agency Administrator Douglas M. Costle	15
1 *The Compact Edition of the Oxford English Dictionary* (1971)	3
Webster's Third New International Dictionary	3

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429
(Consolidated with No. 79-1583)

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

REPLY BRIEF FOR PETITIONERS

The Brief for the Federal Respondent is a lengthy document that attempts to explain and justify the approach that the Occupational Safety and Health Administration ("OSHA") has taken in setting standards for exposure to cotton dust and other toxic substances.[1] Petitioners make three broad points by way of reply.

[1] The Brief for the Federal Respondent, who is the Secretary of Labor, will be referred to as the Secretary's Brief and cited as "OSHA Br."

A list naming all parent companies, subsidiaries that are not wholly owned, and affiliates of corporate petitioners in No. 79-1429 is attached as Appendix A to this Reply Brief.

First, perhaps the most important aspect of the Secretary's Brief is what it leaves unsaid. Despite its great length, the Brief fails to articulate any economically based guidelines or criteria—short of the threatened destruction of an entire industry—that limit the unprecedented power to which OSHA lays claim.

Second, in an obvious reaction to the *Benzene* case,[2] the Secretary now makes a number of concessions that bring his construction of the Occupational Safety and Health Act of 1970 (the "OSH Act" or "Act") much closer to that of the petitioners. However, in an effort to avoid the logic of these concessions, the Secretary suggests that an assessment of costs and benefits in the setting of occupational health standards is inconsistent with congressional intent and impossible to apply in practice. This suggestion cannot withstand analysis.

Third, both the Secretary and the Union Respondents pretend that the record below was what they wish it had been. The reality of the case is different, however, and cannot be changed by respondents' wishful thinking.

I. OSHA STILL HAS NOT ARTICULATED ANY MEANINGFUL OR EFFECTIVE COST-RELATED LIMITATIONS UPON ITS STANDARD-SETTING AUTHORITY.

In the Secretary's Brief, the agency's lawyers have spared no effort to explain OSHA's approach to setting occupational health standards and to demonstrate that this approach reflects the application of "an adequate and intelligible [congressional] standard to guide [OSHA] in fulfilling [its] responsibilities" under the Act. OSHA Br. at 63. When all is said and done, however, OSHA's lawyers have been no more successful than the agency itself in explaining what this "adequate and intelligible

---

[2] *Industrial Union Dep't, AFL-CIO v. American Petroleum Inst.*, 48 U.S.L.W. 5022 (U.S. July 2, 1980).

standard" is that OSHA allegedly is applying. Nor have they been able to show how this alleged standard responds to the provisions of the legislation from which all of OSHA's authority is derived.

The Secretary's Brief makes clear that OSHA continues to lay claim to what the agency characterizes as "admittedly far reaching" authority over American industry. OSHA Br. at 63. And, despite an effort to obscure the point, it seems quite evident that the only cost-related limitation that OSHA acknowledges is the ability of the industry as a whole to bear the costs of any one standard without being ruined financially.

The Secretary appears to recognize that Congress did not intend to confer upon OSHA sweeping and unprecedented authority "to order changes in the way that business is conducted" free of any meaningful and effective economically based constraint. OSHA Br. at 63. Thus, he acknowledges that Section 6(b)(5) of the Act contains qualifying language (such as the term "feasible") that "mandates consideration of practical concerns, including costs, in the setting of standards." *Id.* at 45. And he concedes that this qualifying language—mirroring Congress' practical concerns—"unquestionably limits the Secretary's standard-setting authority." *Id.* However, a careful reading of the Secretary's Brief shows it to be an extended exercise in question begging: Nowhere does it explain how the Secretary construes the term "feasible" in a manner that places an effective cost-related limitation upon OSHA's standard-setting activities.

In various places, the Brief asserts that the term "feasible" must be construed in its most extreme sense as meaning "capable of being done" or "capable of achievement." *Id.* at 39, 40, 48.[3] Taken at face value,

---

[3] The Secretary cites *Webster's Third New International Dictionary* for this meaning, but neglects to point out that the dictionary also defines "feasible" as meaning "suitable," "reasonable," or "practicable." *See id.* at 831 (1971); 1 *The Compact Edition of the Oxford English Dictionary* 973 (1971).

this construction implies the absence of any cost-related limitation whatsoever on OSHA's authority, for maximum protection against a toxic substance for which no absolutely safe level of exposure exists logically would be "capable of achievement" by requiring that the employer cease operations altogether. Recognizing that Congress did not intend the term "feasible" to be given such an extreme reading, OSHA demurs and interprets economic feasibility to mean that the costs must be "affordable." *See, e.g., id.* at 41, 49, 57. But OSHA has never explained what it means by "affordable," and even after reading the Secretary's Brief, one still does not know how this test of "affordability" is to be applied or how it reflects the language of the Act or the underlying congressional intent.[4]

---

[4] The Secretary's Brief points to a hodgepodge of miscellaneous statutory provisions, administrative policies, and judicially-imposed restraints that the Secretary presumably believes may, in the aggregate, provide the missing cost-related restraint on OSHA's wide-ranging power. OSHA Br. at 55-58. But the Secretary does not explain how one can discern in the factors he enumerates an adequate and intelligible criterion to limit the delegation of congressional authority to the agency. Indeed, the Secretary's efforts demonstrate the haphazard nature of any economic limitations short of industry ruination that OSHA is prepared to recognize. Thus, the Secretary observes that

> limitations of technological feasibility will often limit expenditures of financial resources because . . . it will often be [technologically] impossible to achieve the degree of stringency [*i.e.*, maximum protection] that is actually warranted by the health data.

Id. at 57. This limitation on OSHA's authority may be paraphrased as follows: "When there is no additional technology on which to spend more money, OSHA will not mandate further expenditures." Such constraint-by-default is hardly the kind of meaningful and effective cost-related limit that will avoid an unlawful delegation of legislative authority.

Moreover, this litany of factors to which the Secretary's Brief points as protection against irresponsible and unwise regulation is undercut by the agency's own statements. For example, the Secretary's Brief states that OSHA considers industry's need to address

In the end, the only cost-related limit that the Secretary appears to acknowledge is the possibility that a standard might not be "economically feasible" if its impact upon the "long-term profitability and competitiveness" of an industry would be so severely adverse that the continued viability of the industry as a whole would be threatened. *Id.* at 38, 49. When this point might be reached and how the agency would assess the impact that its standard is expected to have on production, employment, competition, prices and trade are matters that are left entirely to speculation. Indeed, it may well be that the agency considers any such impacts to be largely irrelevant: In this very proceeding, OSHA's spokesman stated that the "most recently stated policy of the agency is that . . . the substantive provisions of the standard, that is those which are included to provide protection against the hazard will not be diluted due to considerations of economic or inflationary impact." [5]

The Secretary insists, however, that this Court need not be troubled by the prospect that OSHA, with its open-ended concept of "affordability," will arbitrarily push industries to the brink of financial ruin; nor should the Court be concerned that OSHA will misallocate society's limited industrial hygiene resources, thereby providing employees with a lower overall level of protection against

---

other serious health hazards in the workplace in determining whether a particular standard is "financially affordable" and suggests that, in the Cotton Dust proceeding, OSHA took account of its "proposal for more stringent controls on workplace noise levels as a potentially competing need for capital." *Id.* at 57 n.62. The record indicates that this is not so. Thus, Grover Wrenn, then OSHA's Deputy Director for Health Standards, testified explicitly that OSHA considered the "economic impact upon this industry . . . of the dust standard, combined with the noise standard [to be] *irrelevant* to [the Cotton Dust] proceeding." Transcript of OSHA Hearing ("Tr.") at 75 (emphasis added). References to exhibits introduced during the OSHA hearing are cited as "Ex."

[5] Tr. at 73 (Grover Wrenn).

the host of differing health and safety risks that may exist in the workplace. According to the Secretary, if such misfortunes do result, they would simply reflect the "policy judgments of Congress." *Id.* at 56.

However, as demonstrated at pages 31-35 of petitioners' opening Brief, such policy objectives cannot be attributed to Congress, and even the Secretary appears to be somewhat uncomfortable with this argument. Consequently, his Brief advances a second justification that appears to be more seriously maintained. According to the Secretary, the fact that OSHA *might* regulate in an unreasonable and irresponsible manner (presumably even in a manner that is at odds with the intent of Congress) is irrelevant, since, in the Secretary's view, OSHA's exercise of authority under the Act has been "responsible and practical." OSHA Br. at 37. By regulating in this "reasonable and practical fashion," the Secretary contends, OSHA itself "provides a meaningful brake on regulation." *Id.* at 48.

Under this novel theory, Congress presumably need not provide any meaningful or effective constraint upon the exercise of agency authority; instead, the legislature and the courts may simply trust the regulators to do the right thing. Trusting the regulators, however, is not a substitute for requiring them to adhere to adequate and intelligible congressional standards,[6] particularly when the power to which an agency lays claim is as extravagant and "admittedly far reaching" as it is here. Indeed, the requirement of meaningful and intelligible statutory criteria is intended to prevent precisely the uncanalized agency discretion that the Secretary seeks and thereby to preserve two fundamental elements of our governmental and administrative system: (1) the constitutional

---

[6] *See Benzene*, 48 U.S.L.W. at 5031-32; *Ethyl Corp. v. EPA*, 541 F.2d 1, 68 (D.C. Cir.) (*en banc*) (statement of Leventhal, J.), *cert. denied*, 426 U.S. 941 (1976); McGowan, *Congress, Court, and Control of Delegated Power*, 77 Colum. L. Rev. 1119, 1166 (1977).

separation of powers,[7] and (2) the ability of courts effectively to protect against unauthorized agency action.[8]

Moreover, there is solid ground for disputing the Secretary's view that OSHA has regulated in a "reasonable," "responsible and practical manner." Putting aside the present dispute, one need look no further than the Benzene proceeding for a case in point. In that instance, OSHA mandated the expenditure of more than $500 million without attempting to determine whether there existed any significant health risk that might be reduced by its enormously costly standard. *See Benzene*, 48 U.S.L.W. at 5026, 5031, 5034 (plurality opinion). Instead, the agency required industry to carry the virtually impossible burden of proving a negative—*i.e.*, "the existence of a safe level of exposure." *Id.* at 5035. In so doing, OSHA, as a plurality of this Court noted, avoided its "threshold responsibility" and "exceeded [its] power," *id.*, hardly an indication of "responsible" regulation.[9]

In short, the actions OSHA has taken pursuant to its own construction of its statutory authority demonstrate

---

[7] *A.L.A. Schechter Poultry Corp. v. United States*, 295 U.S. 495, 529-30 (1935).

[8] *See Citizens To Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 415-16 (1971); *Lubrizol Corp. v. EPA*, 562 F.2d 807, 818-19 (D.C. Cir. 1977); 5 U.S.C. § 706(2)(C) (1976). *See generally Amalgamated Meat Cutters & Butcher Workmen v. Connally*, 337 F. Supp. 737, 754-60 (D.D.C. 1971) (3-judge court).

[9] This same unreasonable and irresponsible approach to regulation is evidenced in OSHA's generic cancer policy, 45 Fed. Reg. 5001 (1980), which would impose a host of costly requirements (including a reduction of exposures to the lowest feasible level) "whenever there is a certain quantum of proof . . . that a substance causes cancer at any exposure level." *Benzene*, 48 U.S.L.W. at 5032 n.51 (plurality opinion). Belatedly recognizing these problems, OSHA recently indicated that it plans to "reformulat[e]" the cancer policy. Motion [of OSHA] To Hold Proceedings in Abeyance Pending Administrative Republication of Generic Cancer Standard at 4, *American Petroleum Inst. v. OSHA*, Nos. 80-3018, *et al.* (5th Cir., filed Dec. 22, 1980).

why Congress must adequately delimit the power it grants to administrative agencies rather than delegating wide-ranging authority simply on the basis of an agency's assurances that it can be trusted.[10]

II. DETERMINING WHETHER A REASONABLE RELATIONSHIP EXISTS BETWEEN THE COSTS AND BENEFITS OF A STANDARD IS BOTH CONSISTENT WITH CONGRESSIONAL INTENT AND WITHIN THE AGENCY'S COMPETENCE.

Despite his professed admiration for the manner in which OSHA has exercised its authority, the Secretary appears to recognize that the OSH Act should be construed so as to avoid the constitutional questions that would be raised by a delegation of authority on the basis of trust. This recognition has led him to make a number of concessions regarding the proper interpretation of the Act and the underlying congressional intent. These con-

---

[10] The wage guarantee provision of the Standard, 29 C.F.R. § 1910.1043(f)(2)(v) (1979), Pet. App. at 8-9, is a further example of why OSHA cannot be trusted to delimit its own authority. Conceding that wage guarantee authority is not expressly granted in the OSH Act—as it is in other legislation such as the Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C. § 843(b)(3) (1976)—respondents suggests that such authority can be implied from Section 6(b)(7), which authorizes OSHA, "[w]here appropriate, [to] prescribe suitable protective equipment and control or technological procedures." *See* Union Br. at 52. But one is hard put to perceive how a requirement that employers guarantee the wages of their employees can be deemed to be "suitable protective equipment [or] control or technological procedures." Moreover, respondents concede that Congress did not intend for employers to continue the regular pay of workers who absent themselves from employment. They contend, however, that the congressional concern did not extend to situations where the employee does not cease working altogether but, instead, performs less valuable work requiring a lower level of skill, effort or responsibility. The legislative history canvassed by this Court in *Whirlpool Corp. v. Marshall*, 445 U.S. 1 (1980), indicates that Congress' concern was not so narrow. Rather, Congress intended that the Act not be read to

cessions (which are joined in by the Union Respondents) move the Secretary and the Unions much closer to accepting the construction of the Act urged by petitioners.

For one thing, the Secretary and the Unions appear to have embraced the more balanced and pragmatic reading of the statute that petitioners have urged from the outset. Thus, after reviewing the legislative history, the Secretary concludes that the language of the Act should be construed "in a reasonable and practical fashion," that the qualified language of Section 6(b)(5) does indeed "mandate[] consideration of practical concerns, including costs, in the setting of standards," and that Section 6(b)(5) "unquestionably limits the Secretary's standard-setting authority." OSHA Br. at 45, 48.[11]

Moreover, the respondents appear to have accepted petitioners' contention that an OSHA standard is valid only if it (i) addresses a *significant risk* of material health impairment that would exist in the absence of the standard and (ii) is expected to achieve a *significant reduction in that risk.*[12] And they acknowledge Congress' recognition that OSHA must address a host of new and varying health and safety risks in the workplace and is

---

require that employers compensate a worker for a job that the worker is not performing. The wage guarantee provision of the Standard imposes just such a requirement.

[11] The Union Respondents reach essentially the same conclusion when they quote Senator Dominick for the proposition that Congress intended OSHA to take steps that are "feasible and practical" in enacting occupational health standards. Brief for Union Respondents ("Union Br.") at 34. The Union Respondents describe Senator Dominick as "a principal participant in shaping § 6(b)(5)." *Id.* at 28.

[12] Thus, the Secretary acknowledges that an OSHA standard must be shown to produce "benefits [that] are significant," OSHA Br. at 45, in the sense that it will "substantially reduce" a "significant risk of material health impairment." *Id.* at 27. The Union Respondents agree with this formulation, stating that an OSHA standard should be one that "eliminates or substantially reduces" a "significant risk of . . . health impairment." Union Br. at 27.

not able to focus its attention and society's resources upon a narrow spectrum of such risks.[13] At this point, however, the agreement between the parties ends.

Petitioners contend that OSHA cannot protect employees "so far as possible," *see* 29 U.S.C. § 651(b), against the multiplicity and variety of workplace health and safety hazards if it takes no account of the economic impact of a standard short of the point at which the destruction of an entire industry is threatened. Petitioners read the Act and the legislative history as evidencing a congressional expectation that OSHA would regulate more wisely—that it would assess the health protection benefits of its standards in light of the costs involved—in order to guard against serious misallocations of the finite resources that are available for the protection of worker safety and health. If the costs of a single standard are wholly disproportionate to the reduction in health risk that is expected from the standard, that reduction in risk (and the attendant health protection benefits) cannot, in petitioners' view, be deemed significant. Such a standard is inconsistent both with the "resonably necessary or appropriate" requirement of Section 3(8) of the Act and with the "practical concerns" underlying the qualified language of Section 6(b)(5).

Not so, say respondents. In their view, as long as the costs of a standard stop just short of ruining an entire industry, Congress' "practical concerns" are satisfied, even if the costs of the standard are wholly disproportionate to the resulting health benefits. To justify this extreme reading of the Act, respondents claim that the interpretation urged by petitioners would require OSHA to

---

[13] Thus, the Secretary points out that Congress was aware of the variety of health hazards in the workplace and was "concerned that those [hazards] would be replicated geometrically due to the rapid introduction of new and yet untested chemicals and processes." OSHA Br. at 41. The Union Respondents also call attention to Congress' awareness of the multiplicity of potential new health risks that would have to be addressed by OSHA. *See* Union Br. at 39 n.64.

perform a rigidly formal cost-benefit calculation that places a dollar value on employee lives or health. OSHA Br. at 59. *See also id.* at 38, 45, 59-62; Union Br. at 39-40 n.64.

There is no foundation for this claim. Employee life and health need not be valued in monetary terms and rigidly balanced against the costs of proposed regulatory actions. Congress did intend, however, that OSHA would spend society's industrial hygiene resources wisely. To do so, OSHA must determine whether the health protection benefits of its standards bear a reasonable relationship to the level of resources that must be committed to achieve those benefits—resources that necessarily will be unavailable to achieve other health and safety objectives in the workplace.[14]

---

[14] As noted at pages 41-47 of the opening Brief for Petitioners, the weight of relevant judicial precedent supports a construction of the Act that requires that the health protection benefits bear a reasonable relationship to the costs of an OSHA standard. The Secretary's Brief inaccurately states, OSHA Br. at 50, that the issue of whether OSHA "must perform a cost-benefit analysis in setting standards . . . was first considered by the District of Columbia Circuit in connection with the asbestos standard in *Industrial Union Department* v. *Hodgson*," 499 F.2d 467 (1974). In fact, the affected industry did not challenge the asbestos standard in court, and the question of OSHA's obligation to perform a cost-benefit analysis of any sort was never raised—let alone decided—in that case.

Moreover, the fact that the Secretary "disagree[s]," OSHA Br. at 52 n.56, with the decisions of the Seventh Circuit in *Turner Co. v. Secretary of Labor*, 561 F.2d 82 (1977) and of the Sixth Circuit in *RMI Co. v. Secretary of Labor*, 594 F.2d 566 (1979), does not mean that those cases do not support petitioners' position in the present case or that they are not persuasive. The Secretary also suggests that the *Turner* and *RMI* decisions required OSHA to show a reasonable relationship between costs and benefits only because the hazard addressed was not seriously debilitating or life-threatening. OSHA Br. at 52 n.56. This position is wholly illogical: Rather than making a cost-benefit assessment inappropriate, variations in the seriousness of the hazard are precisely the type of consideration that should be taken into account in assessing

Determining whether the benefits of a standard bear a reasonable relationship to its costs does not require the establishment of some bright line test for deciding whether any particular standard is cost-justified. Rather, as this Court recognized in a related context, Congress understands that agencies may engage in a more " 'limited cost-benefit analysis' " with the objective of assuring that the risk reduction benefits of a standard are not wholly out of proportion to its costs.[15] Similarly, in setting aside the application of OSHA's Cotton Dust Standard to the ginning industry, the Fifth Circuit pointed out the distinction between a "formal cost-benefit analysis [which] demands that regulatory benefits exceed their costs" and the OSH Act's more limited requirement "that the expected costs of OSHA regulations be reasonably related to the expected benefits." *Texas Independent Ginners Association v. Marshall*, 630 F.2d 398, 411 n.44 (5th Cir. 1980).

Indeed, the Consumer Product Safety Commission (a federal agency that also is charged with protecting health and safety) recently proposed a rule describing the methodology that it plans to utilize in performing cost-benefit assessments under Section 9(c) of the Consumer Product

---

the relationship between costs and benefits. In any event, the purported distinction is groundless: Cotton dust has not been shown to be life-threatening, and the reference in the *Turner* opinion upon which the Secretary relies does not limit the decision to "life-threatening" hazards. Moreover, the Occupational Safety and Health Review Commission and OSHA itself consider noise exposure—the health hazard involved in *Turner*—to be a "harmful physical agent," which, like cotton dust, is governed by Section 6(b)(5) of the Act. *See Continental Can Co.*, [1976-1977] OSH Dec. (CCH) 25250, 25255-56, 4 OSH Cas. (BNA) 1541, 1546-47 (1976). Furthermore, the court in *RMI* relied on decisions involving OSHA's Benzene Standard and other cases involving life-threatening hazards. 594 F.2d at 571-72.

[15] *EPA v. National Crushed Stone Ass'n*, 49 U.S.L.W. 4008, 4010 n.10 (U.S. Dec. 2, 1980) (quoting the remarks of Senator Muskie regarding "best practicable technology" standards of the Federal Water Pollution Control Act Amendments of 1972).

Safety Act ("CPSA"). 45 Fed. Reg. 85772 (Dec. 20, 1980). The proposal states that "the Commission is not required to conduct a formal cost-benefit analysis prior to issuing a consumer product safety rule" and will not do so. 45 Fed. Reg. at 85773, col. 2.[16] However, the Commission does plan to perform a cost-benefit assessment to determine whether the "expected benefits of a rule bear a reasonable relationship to the anticipated costs." *Id.* The proposal goes on to explain that

> [t]his test . . . does not require the Commission to find that the quantifiable costs are outweighed by the quantifiable benefits but rather to determine that the total benefits, in the judgment of the Commission, justify the costs.

Id. In short, Congress, the courts and other agencies all have recognized that a responsible determination of whether the costs of regulatory action bear a reasonable relationship to the expected benefits is a sensible, useful and practical exercise that need not involve either a subjective valuation of life and health or a precise balancing of benefits and costs in strict monetary terms.[17]

Respondents' resistance to responsible cost-benefit assessment also reflects their view of other health, safety and environmental legislation. But consideration of such other statutes shows that this view is unjustified.

---

[16] Thus, contrary to the Secretary's suggestion, the Consumer Product Safety Act cannot be distinguished from the OSH Act on the ground that either the language or legislative history of the CPSA "specifically requir[es] that costs be justified by benefits." OSHA Br. at 54. The language of Section 9(c) of the CPSA quoted on page 54 of the Secretary's Brief clearly does not "specifically requir[e]" any such thing. And the Commission itself states that the "legislative history of the CPSA indicates that the Commission is *not* required to conduct a cost-benefit analysis prior to promulgating a consumer product safety rule." 45 Fed. Reg. at 85773, col. 2 (emphasis added).

[17] *See also* Brief for Petitioners at 41-47.

For example, the Secretary concedes that "it was perhaps appropriate for [EPA] to engage in balancing risks against costs" to determine whether the public health is protected against carcinogens by an "ample margin of safety" under Section 112 of the Clean Air Act. OSHA Br. at 55 n.59. According to the Secretary, however, a similar exercise is not appropriate under the OSH Act, since Section 6(b)(5) of that Act "gave guidance to the Secretary with respect to how he should weigh the economic consequences of regulation." *Id.* Presumably, the Secretary is referring to the qualified language of Section 6(b)(5), including the term "feasible," which the Secretary acknowledges reflects "practical concerns" and imposes "unquestionabl[e] limits" on OSHA's standard-setting authority. *Id.* at 45. The Secretary's distinction is spurious, because the language of Section 112 of the Clean Air Act is, if anything, less reflective of such practical concerns or limits and more absolute in its focus on health protection than Section 6(b)(5)—let alone Section 3(8)—of the OSH Act. Consequently, if it is "appropriate for [EPA] to engage in balancing risks against costs," it must be even more appropriate for OSHA to engage in such an exercise as part of its standard-setting activities.[18]

Furthermore, the Federal Water Pollution Control Act Amendments of 1972 (the "Water Act"), 33 U.S.C. §§ 1251 *et seq.* (1976), on which respondents rely, OSHA Br. at 40 n.44; Union Br. at 1b-3b, also supports the position of petitioners. Under the Water Act, EPA is di-

---

[18] In its most recently proposed standard under Section 112 of the Clean Air Act, EPA determined not to control benzene emissions from a particular vent, because it concluded that the energy-consumption "impact [of doing so] outweighs the benefit from controlling this vent." Benzene Emissions from Ethylbenzene/Styrene Plants, 45 Fed. Reg. 83448, 83451, cols. 2-3 (Dec. 18, 1980). EPA also rejected a more stringent control option for this carcinogen after assessing "the relatively small health benefits that would be gained and the costs of requiring [the] more stringent option." *Id.* at 83457, col. 2.

rected to promulgate one set of effluent standards reflecting the "best practicable control technology" ("BPT") and another set reflecting the "best available technology economically achievable" ("BAT"). As the Secretary points out, OSHA Br. at 40 n.44, BPT standards (in contrast to BAT standards) reflect a consideration of costs in relation to effluent reduction benefits. *See EPA v. National Crushed Stone Association*, 49 U.S.L.W. at 4009-4010.

A comparison of the OSH Act and the Water Act shows that OSHA standards more closely resemble BPT than BAT standards. Thus, the qualified language (including the term "feasible") used to describe OSHA standards is similar to the term "practicable" that Congress used in describing BPT.[19] Moreover, economic capability is relevant to determining whether a variance should be granted from a BAT limitation, but is not considered by the agency in determining whether to grant a variance from a BPT standard under the Water Act[20] or from an occupational health standard under the OSH Act.[21]

Thus, OSHA standards, in significant respects, resemble BPT standards under the Water Act. And both the language and the underlying statutory schemes of the respective statutes suggest that Congress intended that

---

[19] In a Statement on the *National Crushed Stone* decision, EPA Administrator Douglas M. Costle explained that in establishing BPT standards, EPA "determine[s] what levels of water pollution control are both *practical* and *affordable*." (Emphasis added.) These are precisely the same terms that the Secretary uses to describe what Congress meant by the term "feasible" in Section 6(b)(5) of the OSH Act. *See* pages 3-4, 9 *supra*. (Copies of Mr. Costle's Statement have been lodged with the Court.)

[20] *See EPA v. National Crushed Stone Ass'n*, 49 U.S.L.W. at 4010, 4013.

[21] *See* Union Br. at 35 (discussing the temporary variance provision of Section 6(b)(6)(A) of the OSH Act).

OSHA standards, like the BPT standards they resemble, would reflect an assessment of benefits in light of costs.[22]

III. OSHA DID NOT MAKE A SUPPORTABLE FINDING THAT THE COSTS OF THE STANDARD BEAR A REASONABLE RELATIONSHIP TO THE EXPECTED BENEFITS OR EVEN THAT THE COSTS WOULD BE "AFFORDABLE."

Respondents apparently do not dispute petitioners' contention that OSHA made no attempt to determine whether the health protection benefits that might be expected from the Cotton Dust Standard bear a reasonable relationship to the Standard's costs. Rather, they argue that OSHA was not required to make any such determination. Nonetheless, OSHA's lawyers have presented an extended factual discussion and analysis that presumably is intended to indicate that the record below would have supported such an agency finding had one been made.

Even if the factual analysis presented by the agency's lawyers were correct, however, the Cotton Dust Standard could not be sustained. For the possibility that the record below might have supported a finding that the agency never made is legally irrelevant. As a plurality of this Court observed in the *Benzene* case: "The standard must, of course, be supported by the findings actually

---

[22] Since the relationship of costs and benefits is not considered in formulating BAT standards under the Water Act, economic capability is relevant to applications for a variance from BAT limitations. By contrast, economic capability need not be considered by the agency in ruling on applications for a variance from BPT limitations, since Congress expected that the relationship between costs and benefits would have been considered when the BPT standard was formulated in the first instance. *See EPA v. National Crushed Stone Ass'n*, 49 U.S.L.W. at 4011. The scheme of the OSH Act reflects this same rationale—*i.e.*, economic hardship is not a qualification for a temporary variance, since the relationship between costs and benefits should have been considered when the OSHA standard was initially formulated.

made by the Secretary, not merely by findings that we believe he might have made." 48 U.S.L.W. at 5035.[23]

In any event, the record below would not have supported a finding that the benefits of the Cotton Dust Standard bear a reasonable relationship to its costs. Indeed, the record in this case cannot support even the finding of "affordability" that the agency purports to have made.

A. The Assessment of Costs

The opening Brief for Petitioners argued that OSHA never made a supportable determination either of how much its Standard would cost or of the economic impact that a standard having such costs would have on the affected industries and the economy as a whole. Recognizing the seriousness of this claim, the Secretary devotes many pages to refuting it but ultimately cannot explain away the fundamental flaws in OSHA's treatment of costs.

A substantial part of the economic argument in the Secretary's Brief is designed to justify OSHA's rejection of the cost estimate made by its own contractor, RTI. Whatever the merits of the argument on this point, however, the fact is that OSHA rejected the RTI analysis of costs. Consequently, RTI's cost estimate cannot be, and was not, used to support OSHA's determination of costs in the present case.

What OSHA did use to support its cost estimate was the Hocutt-Thomas study, which estimated the capital costs of a standard that was much less stringent than the one OSHA adopted. The Secretary's Brief acknowledges this point, *see* OSHA Br. at 19, and attempts to justify OSHA's action on the grounds that (i) Hocutt and Thomas overstated the costs of the less stringent

---

[23] This is simply a restatement of familiar doctrine. *See, e.g., FPC v. Texaco Inc.*, 417 U.S. 380, 397 (1974); *SEC v. Chenery Corp.*, 332 U.S. 194, 196 (1947).

standard that they had analyzed and (ii) the Secretary was justified in presuming that this "overstated" cost of a less stringent standard "was sufficiently reliable to assess the economic impact of the [more stringent] standard" OSHA ultimately adopted. *Id.* Neither branch of this argument withstands analysis.

The first of the three reasons that the Secretary advances in support of the conclusion that the Hocutt-Thomas cost estimate was overstated is that it was based upon the cost of dust control through retrofitting. *Id.* at 18. In fact, OSHA recognized "the validity of estimating compliance costs for retrofit controls" but suggested that "replacement of conventional machines with newer equipment" would reduce the number of machines that would have to be retrofitted or controlled. 43 Fed. Reg. 27350, 27372, col. 3 (1978). The record clearly refutes this suggestion.

OSHA identified only four items of "newer equipment"—automatic opening equipment, chute-fed systems for carding, high speed cards, and open-end spinning frames, *id.* at 27364-67—that it suggested might reduce the need for retrofitting. But the record showed that this equipment clearly could not produce a cost saving in comparison to the retrofitting assumed by Hocutt and Thomas. Thus, after reviewing the comparative costs, RTI, concluded that "no economic advantage is realized in the area of dust control by the installation of automatic opening equipment."[24] This same conclusion holds true where automatic opening equipment is used with chute-fed systems for low speed cards—an arrangement that RTI found to be "not economically feasible." Ex. 144 at 3.

Similarly, no significant saving could be expected from the use of high speed cards, since high speed cards already process eighty percent of the cotton consumed in the textile industry, *id.* at 2, and certain yarns cannot

---

[24] Ex. 144 at 5. *See also id.* at 3, 8. OSHA did not reject RTI's conclusion on this point.

be processed on high speed cards. *Id.*; Tr. 2453 (Hovan Hocutt). In any event, it is undisputed that the cost of dust control for high speed cards is virtually the *same* as for low speed cards. Ex. 144 at 4; Tr. 2376-77, 2436, 2463-65 (Hovan Hocutt).[25]

The final item of "newer equipment" identified by OSHA was open-end spinning frames. But OSHA itself rejected any suggestion that open-end spinning should be considered as a possible cost saving under the Standard. The agency concluded that, because of "the uncertainty involved in awaiting the development of a long staple open end spinning frame, . . . control strategies must be implemented which rely upon what can be done with existing [ring spinning] equipment." 43 Fed. Reg. at 27367, col. 1.[26]

---

[25] Even if some cost saving might otherwise be possible, it would remain theoretical rather than real in light of the excess capacity that currently exists in the textile industry. For there is no incentive to install new production equipment in these early operations unless overall capacity is increased in subsequent operations as well. Tr. 2975-81 (Dr. Parker Reist). But there is no incentive to increase overall capacity in an industry that already has excess capacity. Moreover, the only evidence in the record of a company that actually purchased and installed the new equipment that OSHA identified for opening and carding showed that overall costs increased. Tr. 2591 (James Chapman).

[26] Even if the "new" production equipment identified by OSHA were both (i) likely to be installed within the four-year compliance period and (ii) likely to result in less expensive dust control if installed (neither of which assumptions is correct), it could not be viewed as a ground for concluding that the Hocutt-Thomas estimate of $550 million was an overstatement. For if such equipment is installed to achieve compliance with the Standard, the cost of the equipment would have to be included as a cost of compliance. And, quite apart from the cost of controlling the dust generated by these new machines, the cost of the equipment itself would be approximately four times the total capital cost estimated by Hocutt and Thomas. Thus, the estimated capital cost of automatic opening equipment and chute-fed high speed cards is $818 million. J.A. at 263-65 (L.K. Fitzgerald). An additional $1.3 billion would be

Thus, OSHA has not identified any new production equipment that might replace existing equipment at a cost saving that Hocutt and Thomas ignored. Nor does the record present any basis for concluding that control costs will be reduced by unspecified "improvements in technology that are likely to continue during the period for compliance." 43 Fed. Reg. at 27372, col. 3. To the contrary, the only testimony on this point, that of Hovan Hocutt (who OSHA recognized as an expert in dust control technology), was that for the next seven years little new technology could be expected that would make compliance less expensive in spinning through weaving. 43 Fed. Reg. at 27360, col. 2; J.A. at 459-63; Tr. 2431.

The Secretary's second ground for characterizing the Hocutt-Thomas estimate as an overstatement is that it "did not account for the already low levels in many operations or the fact that more stringent controls in earlier operations would, without additional cost, result in less dust in later operations." OSHA Br. at 18. Although OSHA's lawyers make this claim in the Secretary's Brief, the fact is that OSHA itself did not include any such rationale in its enumeration of reasons for believing that the Hocutt-Thomas estimate was an overstatement. *See* 43 Fed. Reg. at 27372-73. Consequently, this *post hoc* rationalization of counsel must be rejected.[27]

The findings that OSHA did make demonstrate why this belated suggestion of the agency's lawyers is unfounded. For example, OSHA recognized that it would be difficult to implement the standard in

---

required to replace just thirty percent of the 15 million ring spindles in the industry, Ex. 143, App. D, since one open-end spindle would replace four ring spindles at an average cost of $1,200 per spindle. Tr. 2697 (L. K. Fitzgerald).

[27] *See Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962); *SEC v. Chenery Corp.*, 332 U.S. at 196.

> certain operations, such as spinning, where the application of ventilation controls may involve unusual difficulties, significant innovation or indeed necessitate more than improvement in existing technology.

Id. at 27363, col. 1. OSHA's view that these difficulties could be surmounted rested on its belief that "a major effort to solve the dust control problem in spinning" could be made, because a modification of the exposure limit in weaving would permit the industry to "focus more resources on spinning operations." *Id.* at 27367, col. 2. Clearly, this "major effort" involving the "focus [of] more resources on spinning" indicates an expectation that, if the required exposure level in spinning could be achieved at all, it would certainly not be "without additional cost." OSHA Br. at 18.[28]

---

[28] There is also absolutely no support in the record for the suggestion that reducing dust levels in the operations of opening through roving would permit industry to achieve the new exposure limit in spinning or subsequent operations. To the contrary, the record showed that it is "uncommon" for spinning operations to be located in the same room with (or to have the same ventilation system as) the operations that occur before spinning. Ex. 6-17 at 429 (Dr. Merchant); Ex. 6-109 (NIOSH); Tr. 1023-24 (Dr. Merchant); Tr. 2013 (Dr. John Neefus); Tr. 2330 (Dr. John Hatcher). Consequently, the reduction of dust levels in such earlier operations would not be expected to have a favorable impact on dust levels in spinning.

Moreover, the existence of "low levels" of cotton dust, OSHA Br. at 18, in various operations that were sampled does not justify an expectation that such levels could be maintained in the future without further dust control equipment. The record clearly demonstrates that cotton dust levels are a direct function of (1) the quality and coarseness of the cotton being processed, (2) the configuration of the production machinery, and (3) the nature of the textile product being produced. Tr. 2454-55, 2478-79 (Hovan Hocutt); Tr. 2702-04 (L. K. Fitzgerald). Consequently, unless OSHA intends to freeze the sampled workplaces into precisely the same raw material usage and production configuration that obtained at the time of the sampling (a result that would be drastically inconsistent with industry practice), the existence of "low levels" in a particular workplace at a particular time does not indicate that the exposure limits prescribed by the Standard can be met in that workplace—let

The final ground that the Secretary advances for believing that the Hocutt-Thomas estimate was an overstatement is that their "calculations *may* also have included costs for machines processing synthetic material." OSHA Br. at 18-19 (emphasis added). But the fact is that Hocutt and Thomas did not assign compliance costs to any equipment that was used exclusively for synthetics and was located in an area where cotton was not also processed. *See* J.A. at 236-37.[29] There is no reason for OSHA or the Secretary to speculate otherwise.[30]

In sum, none of the three reasons advanced by the Secretary supports the conclusion that the Hocutt-Thomas cost estimate was overstated.[31] But even if it were overstated, neither the agency nor its lawyers have been able to explain what basis there was for OSHA to believe that the Hocutt-Thomas estimate of the capital costs of a much less stringent standard "was sufficiently reliable to

---

alone others—without the need for additional controls. For the "low level" of dust that may exist when one quality of cotton or cotton-synthetic blend is processed can be drastically increased when another quality of cotton is processed (or a different final product is produced) on the same equipment.

[29] Since the Standard defines "cotton dust" as any "dust present in the air during the handling or processing of cotton," Pet. App. at 2, dust produced by a machine processing synthetics must be controlled if it is located in an area where cotton also is handled or processed even though on a separate machine. And, of course, dust produced by a machine processing cotton-synthetic blends is covered by the Standard.

[30] The agency earlier protested that ATMI had failed to produce the data that would permit OSHA to form a judgment on this question. *See* 43 Fed. Reg. at 27372, col. 3. The Secretary now acknowledges, however, that ATMI did in fact supply the survey data, OSHA Br. at 64 n.70, and the questionnaires comprising that data clearly segregate cotton from synthetic processing machinery. *See* J.A. at 391-92.

[31] In addition, for two operations (twisting and warping) Hocutt and Thomas assigned no cost whatsoever to complying with an exposure limit of 0.5 mg/m^3. Pet. App. at 152-56. This zero cost estimate for such operations can hardly be deemed an "overstate-

assess the economic impact of the standard" that OSHA ultimately adopted. OSHA Br. at 19. The Secretary asserts, without reference to the record, that the alleged Hocutt-Thomas

> overstatements tended to offset any differences in cost attributable to the fact that the Hocutt-Thomas estimates were premised in part upon higher dust levels.

Id. But even if this were so, the fact is that OSHA made no attempt to quantify these "differences in cost," and the record contains no basis whatsoever for concluding that these "differences" (whatever they might be) would be offset by any overstatements that Hocutt and Thomas may have made. When all is said and done, the agency's estimate of costs is nothing but bald speculation.[32]

Having failed to develop a responsible or supportable estimate of what its Standard would cost, OSHA was not in a position to analyze the impact that the Standard it actually adopted would have on the affected industries or the economy as a whole. Moreover, as the Secretary concedes, the analysis of economic consequences that OSHA did perform was based upon the assumption that compliance costs would be passed through fully in the form of price increases—an assumption that OSHA's contractor, RTI, characterized as "extreme." Pet. App. at 44; OSHA Br. at 21.[33] Because OSHA had no sup-

---

ment" of compliance costs for the even lower exposure limit ultimately adopted.

[32] The suggestion that OSHA could do nothing more than speculate because "industry refused to disclose much of its supporting data and methodology," OSHA Br. at 19, is frivolous. As the Secretary now acknowledges, *see* note 30 *supra*, ATMI did supply the survey data. The only information that was deleted from the approximately 2,000 pages that were provided to OSHA, J.A. at 388-93; Exs. 171 & 176, was confidential data which, by agreement with OSHA, the industry withheld in order to prevent identification of specific plants.

[33] As noted in petitioners' opening Brief, this extreme assumption was unjustified. *See* Brief for Petitioners at 29. Even if one were

portable estimate of what the Standard would cost and pursued an analysis based on an extreme assumption, it could not rationally conclude that the Standard would be "affordable"—whatever the agency might mean by that term—much less that the expected health benefits of the Standard would be reasonably related to its costs.

B. The Assessment of Health Benefits

Although respondents devote many pages of their Briefs to an analysis of health issues, they cannot disguise the fact that OSHA made no determination that the health benefits of its Standard would bear a reasonable relationship to its costs. Instead, echoing the approach it followed in the Benzene Standard proceeding, OSHA simply announced "that the benefits of the proposed standard are likely to be appreciable" and declined "to carry out further exercises toward more precise calculations of benefit." 43 Fed. Reg. at 27379, col. 3.

Respondents' lawyers now attempt to supply the "more precise calculations of benefit" that OSHA, believing such calculations to be irrelevant, declined to make. Their Briefs are replete with mathematical assessments of what the respondents claim the Standard would produce in the way of health benefits. *See, e.g.*, Union Br. at 11, 42; OSHA Br. at 32. But they do not refer to any instance in which OSHA itself made such findings. And with good reason: Such findings never were made by the agency. Consequently, whatever one might say about the validity of the benefit calculations presented by the

---

to assume that the then-existing textile trade agreements would continue indefinitely—a speculative assumption at best—textile imports would grow at a rate that exceeds the growth rate of the domestic industry. Pet. App. at 199-201 (John P. Figh). This would result in "greater penetration from the imports" and "decided pressure on the ability to raise prices." *Id.* at 199, 201. Moreover, as pointed out by the American Farm Bureau Federation, interfiber competition has continued to increase, with man-made fibers taking a growing share of the market from cotton. *See* Amicus Curiae Brief of American Farm Bureau Federation in Support of Petitioners at 9-10 & n.6.

lawyers for the Secretary and Union Respondents, those benefit calculations have no relevance here, since the Standard must rest upon findings made by the agency, not those made by its lawyers after the fact.[34]

Moreover, even if they were relevant, the benefit calculations made by respondents' lawyers are simply not supportable. What respondents have done is to suggest that the benefits of the Standard can be determined simply by applying the prevalence rates reported in the studies of Dr. Merchant to populations of workers who respondents claim might be exposed to cotton dust in the textile industry. *See, e.g.*, OSHA Br. at 32; Union Br. at 11. While this may be an interesting exercise, it has little relevance to determining the benefits that might be expected from OSHA's Standard.[35]

For one thing, Dr. Merchant's study reports prevalence rates and does not show the probability that workers exposed to specified levels of cotton dust will develop byssinosis. *See* Brief for Petitioners at 9. And even in terms of prevalence, Dr. Merchant's findings cannot properly be applied to the industry as a whole. As Dr. Merchant himself stated: "Clearly no inference . . . can be drawn as to the prevalence of byssinosis in the entire U.S. textile industry . . . ." J.A. at 435. The Secretary ac-

---

[34] *See* pages 16-17 & n.23 *supra*.

[35] Respondents' Briefs also make repeated references to an estimate by Dr. Arend Bouhuys that 35,000 individuals may have disabling lung function related to their employment in the cotton textile industry. *See, e.g.*, OSHA Br. at 4, 31 n.36; Union Br. at 2. This figure cannot be credited. As Dr. Bouhuys admitted, it is "an extrapolation from limited data and should not be considered as anything but a crude estimate." J.A. at 155. Even a casual reading of his statement reveals how "crude" and unjustified Dr. Bouhuys' extrapolation and estimate really is. Thus, his analysis assumes that 200,000 workers are employed in "dusty jobs" (a term he does not define) in the cotton textile industry and *that all of these are 45 years of age or older*. *Id.* at 154. It also extrapolates characteristics of an admittedly "limited" study population (645 active and retired workers) to a putative population at risk of 425,000 active and retired workers. *Id.*

knowledges Dr. Merchant's statement but claims that it is "irrelevant." OSHA Br. at 33 n.39. But it clearly is not irrelevant: There was good reason for Dr. Merchant to caution against inferring that the prevalence rates found in his study could be applied to the entire textile industry.[36]

Thus, even if Merchant's predicted prevalence rates are accepted at face value (and petitioners contend that they cannot be[37]), they could not be used as respondents'

---

[36] Thus, Dr. Merchant's study was concluded by the time that the cotton dust exposure limits that the new Standard supersedes took effect for the industry as a whole at the end of May 1971. *See* OSHA Br. at 2. Consequently, it does not reflect the effect of the exposure limits that have prevailed since that time. Moreover, Dr. Merchant studied workers at three cotton and two cotton-synthetic blend plants, whereas the more typical ratio of plants in the industry is the reverse—with cotton-synthetic blend plants predominating over plants that process only cotton. For example, the 1971 study of Burlington Industries' plants revealed that thirteen of the plants processed cotton-synthetic blends, while only six processed all cotton. Ex. 71, Part IV, Report III, Table 1. A similar ratio prevailed when West Point-Pepperell commenced its general medical surveillance program in 1973. Tr. 1648-49 (Dr. Jack Whitworth). Since byssinosis prevalence rates are generally found to be substantially lower in cotton-synthetic blend plants than in all-cotton plants, *see id.* at 1696-97, the results of a study in which all-cotton plants were overrepresented would give a skewed picture of prevalence rates in the industry as a whole.

[37] *See* Brief for Petitioners at 10-11. The Secretary's criticisms of various studies that were inconsistent with Dr. Merchant's results is unfounded. For example, the Secretary states that, in two of these other studies (those of Dr. Weill and Dr. Morgan), dust levels "were generally much lower than" 0.5 mg/m^3. OSHA Br. at 10 n.16. But the fact is that 40 percent of the employees in the yarn preparation areas studied by Drs. Weill and Morgan were exposed to dust levels above 0.5 mg/m^3. *See* J.A. at 162 (Dr. Hans Weill); Ex. 39, Tables 1 & 2 (Dr. Morgan); Ex. 43a (Dr. Morgan). (Employees working with "synthetic" materials as shown in Ex. 43a were excluded from Dr. Morgan's study.) By contrast, less than 25 percent of the workers in the yarn preparation areas studied by Dr. Merchant were exposed to dust levels above 0.5 mg/m^3. J.A. at 38, Group 3. By the same token, the fact that there was a large

lawyers use them here—a point that the agency itself may have recognized implicitly when it failed to make the calculations in which its lawyers now engage. Moreover, even this unjustified use of the Merchant study by respondents' lawyers does not show that the Standard is likely to produce any substantial health benefits beyond those that could be realized at far lower cost through implementation of medical surveillance programs with more moderate exposure limits. For respondents' mathematical manipulations take no account of the impact that a medical surveillance program would have on reducing the incidence of byssinosis (particularly the serious grades) at the permissible exposure levels that were proposed by the industry.[38]

None of the workers studied by Dr. Merchant had participated in a medical surveillance program; consequently, the results reported by Dr. Merchant do not indicate how the prevalence of byssinosis would vary from one exposure level to another if the employees involved participated

---

range of dust levels in the Weill study is not a ground for rejecting it. If it were, the Merchant study might have to be rejected as well, since Dr. Merchant selected his plants for study on the basis of "extremes of exposure." *Id.* at 27.

[38] Respondents persist in suggesting that even the mild, reversible and nondisabling symptoms of byssinosis constitute a "material impairment of health" within the meaning of the OSH Act. *See* OSHA Br. at 31 (acute form of byssinosis constitutes "material impairment of health"); Union Br. at 5, 44. Since the court below did not find that these symptoms constitute "material impairment of health" within the meaning of the Act, Pet. App. at 50-51 n.83, 617 F.2d at 654 n.83, the Standard cannot be supported on the basis of respondents' characterization of these reversible and nondisabling symptoms. We would also note that in its recent policy statement allowing partial-shift wearing of respirators under the Cotton Dust Standard, OSHA distinguished between the hazards presented by exposure to carcinogens and the less serious hazard presented by cotton dust even at a level that exceeds the " 'lowest feasible level' of exposure." (Copies of the OSHA News Release describing the new respirator policy have been lodged with the Court.)

in a medical surveillance program, supplemented by respirator use and employee transfer in appropriate cases. This is a crucial point, since even OSHA acknowledged that such a program of medical surveillance is likely to reduce the incidence of byssinosis significantly.[39]

In sum, respondents' lawyers have attempted to supply health benefit findings that the agency itself failed to make. And in making these findings for the agency, respondents' lawyers manipulate the record in ways that are simply unjustified. The simple fact is that OSHA itself did not perform the kind of health benefit assessment that respondents' lawyers would have wished, and the record below cannot be altered by the mathematical sleight of hand performed by the agency's lawyers after the proceeding has been long closed.

---

[39] *See* 43 Fed. Reg. at 27359, col. 3; Brief for Petitioners at 15, 49. Indeed, the Secretary in part attributes the disparity in the prevalence rates found in the Weill and Morgan studies on the one hand, and in the Merchant study on the other, to the fact that the employees studied by Weill and Morgan "had been part of an on-going worker surveillance program," while the employees studied by Merchant had not. OSHA Br. at 10 n.16. And OSHA agreed that pulmonary function testing utilized as part of a medical surveillance program would diminish the likelihood that pulmonary impairment would occur. As stated by OSHA: "These tests will ensure that any significant change from the baseline determination will become apparent before material impairment occurs." 41 Fed. Reg. 56498, 56502, col. 1 (1976).

CONCLUSION

For the reasons set forth above and in the Brief for Petitioners, the judgment of the Court of Appeals should be reversed and the case remanded with instructions to grant the petitions for review and vacate the Standard.

Respectfully submitted,

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

GREGORY B. TOBIN
OGLETREE, DEAKINS, NASH, SMOAK, STEWART AND EDWARDS
First National Bank Tower
Two Peachtree Street, N.W.
Atlanta, Georgia 30383

NEIL J. KING
Counsel of Record
A. STEPHEN HUT, JR.
ANDREW N. VOLLMER
WILMER & PICKERING
1666 K Street, N.W.
Washington, D.C. 20006
(202) 872-6000

Counsel for American Textile Manufacturers Institute, Inc.

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Milliken and Company

JOSEPH K. MADDOX, JR.
P.O. Box 5784
Spartanburg, S.C. 29304

Counsel for Spartan Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Hermitage, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Arkwright Mills

ROBERT T. THOMPSON
GARY S. KLEIN
THOMPSON, MANN & HUTSON
The Daniel Building
Suite 2222
Greenville, S.C. 29602

Counsel for Blair Mills, Inc.

HARLAN H. HUNTLEY
ROGER L. TUTTLE
2291 Memorial Drive
Danville, Virginia 24541

Counsel for Dan River, Inc.

SAMUEL K. ABRAMS
BRIAN E. MORAN
BAKER & HOSTETLER
818 Connecticut Ave., N.W.
Washington, D.C. 20006

H. J. ELAM, III
NEIL W. KOONCE
Cone Mills Corporation
Greensboro, N.C. 27405

Counsel for Cone Mills Corporation

DAN M. BYRD, JR.
J. SPRATT WHITE
P.O. Box 70
Fort Mill, S.C. 29715

Counsel for Springs Mills, Inc.

ROBERT H. BORK
142 Huntington Street
New Haven, Connecticut 06511

Counsel for Fieldcrest Mills, Inc.

THOMAS A. EVINS
CLYDE H. HAMILTON
BUTLER, MEANS, EVINS & BROWNE
P.O. Box 451
Spartanburg, S.C. 29304

Counsel for Mayfair Mills

FRED M. RICHARDSON
LOVIC A. BROOKS, JR.
CHARLES A. EDWARDS
CONSTANGY, BROOKS & SMITH
1900 Peachtree Center Building
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

Counsel for Riegel Textile Corporation

RICHARD H. MONK, JR.
C. POWERS DORSETT
West Point-Pepperell, Inc.
P.O. Box 71
West Point, Georgia 31833

Counsel for West Point-Pepperell, Inc.

January 14, 1981

APPENDIX A

Catawba-Charlab, Inc.

Cliffside Railroad Company

Schaeffer Engineering

Societe Francaise des Fabrications-RIBY

Establissements Schaeffer & CIE

Societe des Impressions Sur

La Societe Cotonniere Ivoirenne

Societe Beninoise des Textiles

Blue Bell Cote d'Ivoire

Impressions de Textiles de la Republique Popularie de Congo

Sonitextil (Societe Nigerienne des Textiles)

Amoskeag Company

Crossley Karastan Carpet Mills, Ltd.

Fieldcrest Ireland, Ltd.

Lantor International Limited

Lantor of Australia Pty. Limited

Wool Filters International

Firet, B.V.

CODI International, B.V.

CODI GmbH

Lantor Nonwoven of South Africa (Proprietary) Limited

Lantor Hong Kong Limited

Lantor (U.K.) Limited

Owners of over 50% of Springs Mills, Inc.'s common stock also own large interests in the Bank of Lancaster and the L & C Railroad. Springs Mills disclaims these companies are affiliated.

Nos. 79-1429, 79-1583

MICHAEL RODAK

In the Supreme Court of the United States

OCTOBER TERM 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., et al.,
Petitioner,

No. 79-1429 v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,
Respondent.

NATIONAL COTTON COUNCIL OF AMERICA,
Petitioner,

No. 79-1583 v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,
Respondent.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA

AMICUS CURIAE BRIEF OF AMERICAN FARM BUREAU FEDERATION IN SUPPORT OF PETITIONERS

ALLEN A. LAUTERBACH,
General Counsel,

C. DAVID MAYFIELD,
Assistant Legal Counsel,

AMERICAN FARM BUREAU FEDERATION
225 Touhy Avenue
Park Ridge, IL 60068
(312) 399-5733
Attorneys for Amicus Curiae.

AMERICAN FARM BUREAU FEDERATION
Amicus Curiae.

UNITED STATES LAW PRINTING CO., CHICAGO, ILLINOIS 60618 (312) 525-6581

TABLE OF CONTENTS

	PAGE
Table of Authorities	ii
Interest of Amicus Curiae	2
Argument	3
I. In promulgating a safety and health standard under the Occupational Safety and Health Act, the Secretary of Labor must determine whether the standard is economically feasible by finding a reasonable relationship between the costs and benefits of the standard	3
II. The Secretary failed to consider the cost of the cotton dust standard to cotton farmers and thereby did not determine the economic feasibility of the standard under the Occupational Safety and Health Act	8
Summary of Argument	13
Conclusion	14
Certificate of Service	15

TABLE OF AUTHORITIES

Cases

PAGE

AFL-CIO v. Brennan, 530 F. 2d 109 (3rd Cir. 1975) 4, 6

AFL-CIO v. Marshall, 617 F. 2d 636 (D.C. Cir. 1979), Opinion Below 5, 7

A.L.A. Schechter Poultry Corporation v. United States, 295 U.S. 495, 55 S. Ct. 837 (1935) 8

American Iron & Steel Institute v. OSHA, 577 F. 2d 825 (3rd Cir. 1978) cert. dismissed ..... U.S. ....., 101 S. Ct. 38 (1980) 4

American Petroleum Institute v. OSHA, 581 F. 2d 493 (5th Cir. 1978), affirmed on other grounds, 444 U.S. 818, 40 CCH S. Ct. Bull. p. B4095 7

Industrial Union Department, AFL-CIO v. Hodgson, 499 F. 2d 467 (D.C. Cir. 1974) 4, 5, 11

Panama Refining Co. v. Ryan, 293 U.S. 388, 55 S. Ct. 241 (1935) 8

RMI Co. v. Secretary of Labor, 594 F. 2d 566 (6th Cir. 1979) 7

Turner Company v. Secretary of Labor, 561 F. 2d 82 (7th Cir. 1977) 4, 6

Statutes

Occupational Safety and Health Act, 29 U.S.C. 651 *et seq.* 3

29 U.S.C. 652(8) 3, 4, 13

29 U.S.C. 655(b)(5) 3, 4, 6, 7, 13

Regulations

PAGE

29 CFR 1910.1043 8

Other Authorities

"Cost of Producing Selected Crops in the U.S.," Report of Committee on Agriculture, Nutrition, and Forestry, U.S. Senate, March 31, 1978, page 12 10

Cotton and Wool Situation, ESCS, U.S. Department of Agriculture, May 1978. Table 23—U.S. consumption of fibers: Total and per capita, page 36 11

Potential Cropland Study, SCS, U.S. Department of Agriculture, Statistical Bulletin No. 578, pages 4 and 5 13

"The Economic Outlook For U.S. Cotton," Report of the National Cotton Council, January, 1980 ..... 9, 10

U.S. Department of Commerce, Bureau of the Census, Census of Agriculture, 1974, Vol. II, Part 6 (Crops, Nursery and Greenhouse products), page 28 12

In the
Supreme Court of the United States

OCTOBER TERM 1980

Nos. 79-1429, 79-1583

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., et al.,

Petitioner,

No. 79-1429 v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

NATIONAL COTTON COUNCIL OF AMERICA,

Petitioner,

No. 79-1583 v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA

AMICUS CURIAE BRIEF OF AMERICAN FARM BUREAU FEDERATION IN SUPPORT OF PETITIONERS

The American Farm Bureau Federation respectfully submits this brief *amicus curiae.* Pursuant to Supreme Court Rule 36, this brief is filed with the written consent of the parties, which consent has been filed with the Clerk of this Court.

INTEREST OF AMICUS CURIAE

The American Farm Bureau Federation ("Farm Bureau") is a voluntary general farm organization organized in 1919 under the "General Not For Profit Corporation Act" of the State of Illinois with its principal office in Park Ridge, Illinois. Farm Bureau has as its purpose the promotion, protection and representation of the business, economic, social and educational interests of the farmers and ranchers of the United States. It has member state Farm Bureau organizations in all of the states (except Alaska) and in Puerto Rico, representing more than 3 million member families.

The interest of the American Farm Bureau in these consolidated cases is to represent and protect the economic interest of Farm Bureau members who produce cotton and who will be adversely impacted by the cotton dust standard promulgated by the Secretary of Labor and the Occupational Safety and Health Administration.

Although cotton production and harvesting are not directly regulated by the standard, the tremendous cost of compliance for the textile and non-textile cotton processing industries will necessarily be passed back to cotton farmers resulting in reduced revenue for raw cotton production.

In issuing the cotton dust standard, the Secretary failed to recognize the economic impact on cotton farmers. While Farm Bureau supports safety in the workplace, it submits that the costs of health and safety standards must be fully considered and bear a reasonable relationship to the intended benefits. Safety regulation which ignores such principle is unrealistic, economically damaging and will not serve the legitimate safety and health expectations of Farm Bureau members and others.

ARGUMENT

I.

IN PROMULGATING A SAFETY AND HEALTH STANDARD UNDER THE OCCUPATIONAL SAFETY AND HEALTH ACT, THE SECRETARY OF LABOR MUST DETERMINE WHETHER THE STANDARD IS ECONOMICALLY FEASIBLE BY FINDING A REASONABLE RELATIONSHIP BETWEEN THE COSTS AND BENEFITS OF THE STANDARD.

In defending health and safety standards under the Occupational Safety and Health Act (OSHA), 29 U.S.C. 651 *et seq.*, the Secretary of Labor has been repeatedly faced with the issue of interpreting the language contained in Sections 6(b)(5) and 3(8) of the Act. 29 U.S.C. 655(b)(5) and 652(8).[1]

---

[1] Section 6(b)(5) relates to standards dealing with toxic materials or harmful physical agents and provides as follows:

> "The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of

(footnote continued)

Under Section 6(b)(5) the Secretary must establish a standard ". . . which most adequately assures, to the extent feasible . . . that no employee will suffer material impairment of health or functional capacity. . . ." In concert, Section 3(8) defines a safety and health standard as a standard requiring actions ". . . reasonably necessary or appropriate to provide safe or healthful employment. . . ."

It is generally established that the effect of both Sections is to require that a standard be economically as well as technologically feasible. *Industrial Union Department, AFL-CIO* v. *Hodgson,* 499 F. 2d 467 (D.C. Cir. 1974); *AFL-CIO* v. *Brennan,* 530 F. 2d 109 (3rd Cir. 1975); *Turner Company* v. *Secretary of Labor,* 561 F. 2d 82 (7th Cir. 1977); and, *American Iron & Steel Institute* v. *OSHA,* 577 F. 2d 825 (3rd Cir. 1978), cert. dismissed ..... U.S. ....., 101 S. Ct. 38 (1980).

While the Secretary and the court below do not disagree that a Section 6(b)(5) standard must be "economically" feasible, both have erroneously concluded that the economic feasibility requirement of the law is fulfilled once the

---

(footnote continued)

the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired." 29 U.S.C. 655(b)(5).

Section 3(8) defines the term "occupational safety and health standard" as follows:

"The term 'occupational safety and health standard' means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." 29 U.S.C. 652(8).

Secretary concludes that such standard will not cause the economic ruin of the regulated industry.[2]

The adoption and continued application of such an "economic disaster" feasibility test will impose unjustified cost burdens on industry and agriculture and will serve only to thwart the legitimate health and safety goals which Congress intended by enactment of the Occupational Safety and Health Act.

Health and safety standards should not be founded on an idealistic and totally unrealistic view that human safety and health have no economic boundaries. Virtually every moment of human life involves some risk of danger and

---

[2] In the opinion below, the circuit court stated:

"We are assisted here by this court's interpretation of the feasibility requirement in *Industrial Union Department, AFL-CIO* v. *Hodgson* [499 F. 2d 467, 477-78]. In that case, we concluded that the feasibility requirement reflects Congress' recognition that employees would not be protected if their employers were put out of business." [Footnote omitted].

* * *

"Here the agency expressed [sic] concluded 'that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation.' [Footnote omitted].

Of course, the agency's underlying cost estimates are not free from imprecision. Nonetheless, on reviewing the record we believe that OSHA fairly considered all the economic data submitted before constructing its estimates. The agency responded to significant criticisms of the cost estimates it used, and explained the economic impact it projected for the textile industry. As a result, this court is satisfied that OSHA has substantial support in the record for its cost estimates and finding of economic feasibility for the textile industry." *AFL-CIO* v. *Marshall,* 617 F. 2d 636 at 655 and 662 (D.C. Cir. 1979).

a corresponding pattern of behavior which accepts or obviates such risks based on economic or other practical considerations.

The third Circuit Court of Appeals in *AFL-CIO* v. *Brennan*, 530 F.2d 109, at 121 (3rd Cir. 1975), clearly recognized that noble but unacceptable application of unlimited safety when it facetiously stated: "Undoubtedly the most certain way to eliminate industrial hazards is to eliminate industry."

However, to avoid the apparent absurdity expressed in the third circuit decision, the Secretary is only willing to go one step further by requiring that safety requirements do not result in the total displacement of an entire industry.

The erroneous nature of the Secretary's position is further demonstrated by the possibility that the Secretary would feel compelled to issue a single safety standard on the basis that it would not cause economic disaster, even though such standard may needlessly consume an industry's entire regulatory cost paying ability. All further safety and health regulation would be precluded regardless of need. Clearly Congress would not intend to allow the Occupational Safety and Health Administration to adopt such a narrow and irresponsible approach.

Before OSHA regulates it must find that the regulation is economically feasible under Section 6(b)(5) to the extent that there exists a reasonable relationship between the benefits and the costs of the regulation. The mere fact that industry or agriculture can "absorb" the cost of a regulation cannot, alone, serve as a sound basis of economic feasibility when there is no balancing of the costs with the benefits. This position of cost-benefit balancing has been specifically followed in *Turner Company* v. *Secre-*

tary of Labor, 561 F. 2d 82 at 85 (7th Cir. 1977), in *RMI Co.* v. *Secretary of Labor,* 594 F. 2d 566 (6th Cir. 1979),[3] and, in *American Petroleum Institute* v. *OSHA,* 581 F. 2d 493 (5th Cir. 1978), affirmed on other grounds, 444 U.S. 818, 40 CCH S. Ct. Bull. p. B4095: "Although the agency does not have to conduct an elaborate cost-benefit analysis . . . it does have to determine whether the benefits expected from the standard bear a reasonable relationship to the costs imposed by the standard. . . ." 581 F. 2d at 503.

Determination of a cost-benefit relationship as a prerequisite to issuing an OSHA standard is not a task which will unjustifiably burden the Secretary as intimated by the court below: "Especially where a policy aims to protect the health and lives of thousands of people, the difficulties in comparing widely dispersed benefits with more concentrated and calculable costs may overwhelm the advantages of such analysis." [Footnote omitted] *AFL-CIO* v. *Marshall,* 617 F. 2d 636 at 665 (D.C. Cir. 1979). As stated by the court in *American Petroleum Institute* v. *OSHA,* 581 F. 2d 493 at 502: "Although 29 U.S.C.A. 655(b)(5) requires the goal of attaining the highest degree of health and safety protection for the employee, it does not give OSHA the unbridled discretion to adopt standards designed to create absolutely risk-free workplaces regardless of cost. To the contrary, that section requires standards to be feasible, and it contains a number of pragmatic limitations in the form of specific kinds of information OSHA must consider in enacting standards dealing with toxic materials. Those include 'the best available evidence,' 'research, demonstrations, experiments, and such other in-

[3] "But neither will controls necessarily be economically feasible merely because the employer can easily (or otherwise) afford them. In order to justify the expenditure, there must be a reasonable assurance that there will be an appreciable and corresponding improvement in working conditions." 594 F. 2d 566 at 573.

formation as may be appropriate,' 'the latest available scientific data in the field,' and 'experience gained under this and other health and safety laws.' "

Failure by the Secretary to make a determination that there is a reasonable relationship between the costs and benefits amounts to agency usurpation of Congressional authority in violation of the non-delegation doctrine. *A.L.A. Schechter Poultry Corporation* v. *United States,* 295 U.S. 495, 55 S. Ct. 837 (1935); *Panama Refining Co.* v. *Ryan,* 293 U.S. 388, 55 S. Ct. 241 (1935).

Without interpreting Sections 6(b)(5) and 3(8) of the OSHA to require a cost-benefit relationship, the Secretary will be making virtually unconstrained choices of important social policy over the future of entire industries and agriculture. "The Congress manifestly is not permitted to abdicate or transfer to others the essential legislative functions with which it is thus vested." *Panama Refining Co.,* 293 U.S. 388 at 421, 55 S. Ct. 241 at 248.

II.

THE SECRETARY FAILED TO CONSIDER THE COST OF THE COTTON DUST STANDARD TO COTTON FARMERS AND THEREBY DID NOT DETERMINE THE ECONOMIC FEASIBILITY OF THE STANDARD UNDER THE OCCUPATIONAL SAFETY AND HEALTH ACT.

Nowhere did the court below or the Secretary fairly consider the cost ramifications of the cotton dust standard to cotton farmers.

While American cotton farmers are not directly regulated by the cotton dust standard in controversy,[4] they will be adversely affected because of the economic cost

[4] See 29 CFR §1910.1043 (OSHA Cotton Dust Standard).

consequences of the standard to the textile and non-textile cotton processing industries.

Based on an estimated cost of over 2.6 billion dollars to industry as assessed by OSHA's contractor for the cotton dust economic feasibility study, it has been further estimated that American cotton farmers will incur an annual revenue loss of more than 100 million dollars at 1976 prices. Such a revenue loss will take the form of reduced raw cotton consumption by U.S. mills.[5]

The estimated 100 million dollar loss to farmers may already be evidenced. For four straight years immediately preceding publication of OSHA's proposed cotton dust standard, cotton had stabilized its share of the U.S. mill fiber consumption at about 29 percent.[6] But,

---

[5] See National Cotton Council of America, Petition for a Writ of Certiorari filed with this Court, No. 79-1583 at pages 8 and 9.

[6] "The Economic Outlook For U.S. Cotton," Report of the National Cotton Council, January, 1980, Appendix, Table 26.

Table 26
TEN-YEAR U.S. TEXTILE MILL FIBER CONSUMPTION
(Million Bales & Percent)

Calendar	Total	Cotton		Man-Made*		Silk & Wool	
Year	Bales	Bales	%	Bales	%	Bales	%
1970	19.9	7.9	39.5	11.5	57.6	.6	4.7
1971	22.3	8.3	37.0	13.6	60.9	.5	3.8
1972	24.3	8.0	33.0	15.8	64.9	.5	4.2
1973	26.0	7.6	29.2	18.1	69.3	.4	4.3
1974	23.2	6.9	29.7	16.0	69.2	.2	3.7
1975	22.1	6.4	28.9	15.5	69.9	.3	2.2
1976	24.1	7.1	29.2	16.8	69.5	.3	4.1
1977	26.4	6.6	26.0	18.5	72.9	.3	2.7
1978	25.9	6.3	24.6	19.2	74.4	.3	3.1
1979	26.7	6.4	24.0	20.0	74.9	.3	1.1

Due to rounding, individual numbers may not add to totals shown.

* Includes acetate, staple and waste.

with publication of the proposed very severe standard, cotton's market share began to slip. In 1979, cotton's share of U.S. mill fiber consumption was 6.4 million bales. If cotton had retained its pre-dust-standard market share, 1979 consumption by U.S. mills would have been 7.5 million bales.[7]

As a class, cotton farmers are not "consumers" to whom industry can "pass through" the cost of regulation without substantial and lasting impact. Unlike consumers, farmers cannot easily and freely decide whether to accept or reject the added regulatory cost by making a simple decision while in the department store. Cotton is one of the most expensive crops to produce, costing an average of $267.39 per acre.[8] Pre-planting investment must be made in cotton picking and stripping machinery, fertilizer, lime, specialized pesticides, defoliants and other items. The purchase, lease and maintenance of land with suitable soil and drainage conditions is an even greater prerequisite for production.

U.S. farmers faced with a substantial investment in a cotton producing operation simply cannot readily absorb an *annual* 100 million dollar loss. A brief review of the economic ramifications of such a cost impact demonstrates the economic predicament of the cotton farmer.

Is it possible for cotton producers to pass forward the estimated 100 million dollar revenue loss to the purchasers of raw cotton and to cotton end product customers? The

---

[7] *Id.*

[8] "Cost of Producing Selected Crops in the U.S.," Report of Committee on Agriculture, Nutrition, and Forestry, U.S. Senate, March 31, 1978, page 12.

success of such a strategy is limited by a number of factors. First, the purchasers of domestic raw cotton and finished cotton products are already faced with a heavy share of an estimated 2.6 billion dollar regulatory cost. Second, further increase in the cost of raw cotton and finished products which would result from a pass forward will assuredly contribute to the increased purchase of more competitively priced cotton imports by U.S. consumers and the utilization of man-made fiber substitutes by U.S. mills.[9]

In spite of the decision in *Industrial Union Department, AFL-CIO* v. *Hodgson,* 499 F. 2d 467 (D.C. Cir. 1974), upon which the court below placed great emphasis for an understanding of the OSHA economic feasibility requirement *for industry,* no consideration has been given to the impact from foreign competition and reliance on substitute fiber on cotton farmers: "Similarly, if the competitive structure or posture of the industry would be otherwise adversely affected—perhaps rendered unable to compete with imports or with substitute products—the Secretary could properly consider that factor. These tentative examples are offered not to illustrate concrete instances of economic unfeasibility but rather to suggest the complex elements that may be relevant to such a determination [Footnotes omitted]." 499 F. 2d at 478.

Can cotton producers reduce or cease cotton production altogether and grow alternative crops which hopefully would allow a more profitable return than cotton? Some producers may find such a total transition an impossibility

---

[9] U.S. per capita consumption of cotton for the period 1966-1977 dropped from 25.4 to 16.1 pounds.

Cotton and Wool Situation, ESCS, U.S. Department of Agriculture, May, 1978. Table 23—U.S. consumption of fibers: Total and per capita, page 36.

in view of a combination of factors including soil and climate conditions, technological inability and financial inability to reinvest in the necessary machinery. Furthermore, while many of the potential alternative crops, particularly grain crops, may appear economically desirable to the individual farmer, the aggregate economic effect of hundreds or thousands of cotton farmers[10] shifting their acreage to soybeans, sorghum, wheat or some other grain crop could be substantially harmful. Price levels in given markets would undoubtedly drop, thereby imposing undue hardship on newcomers as well as on producers who have traditionally grown a crop in reliance on normal market performance.

A final question is whether cotton growers who cannot diversify into substitute crops would liquidate farming operations and seek other employment? Liquidation may take the form of selling property to another larger producer or selling property for dedication to non-farm use. Either course of action has both economic and social cost implications.

To the extent that farming operations are consolidated to form larger corporate farms, U.S. food and fiber production will tend to become more centralized and ultimately less competitive to the disadvantage of buyers and processors of agricultural raw products and consumers. On the other hand, farm land may be permanently taken out of production thereby further contributing to the current

---

[10] As of 1974, approximately 89,536 individual farms produced 12,223,500 acres of cotton. U.S. Department of Commerce, Bureau of the Census, Census of Agriculture, 1974, Vol. II, Part 6 (Crops, Nursery and Greenhouse products), page 28.

trend in loss of U.S. cropland and the corresponding reduced potential for future production.[11]

Whether farmland is irretrievably lost or production is further centralized, there will occur an erosion of the existing form of American agriculture which has proven to be socially and economically desirable.

Without consideration of the foregoing potential economic effects of the dust standard on agriculture, the Secretary cannot make the required finding of economic feasibility.

SUMMARY OF ARGUMENT

Sections 6(b)(5) and 3(8) of the OSH Act require that the Secretary initially determine the "economic feasibility" of a standard regulating toxic materials and harmful physical agents. In establishing the economic feasibility of a standard, the Secretary must find that a reasonable relationship exists between the costs and benefits of the

---

[11] According to a 1977 study by the Soil Conservation Service, U.S. Department of Agriculture, U.S. cropland declined from 431 million to 400 million acres between 1967 and 1975. The decline occurred in eight of the ten production regions, including major cotton producing areas—the southeast, the southern plains and California. The same study indicates that of nearly 1 billion acres of *noncropland* in the United States, only 111 million acres have potential for conversion to cropland. Of 111 million acres, 43.4 million will encounter one or more conversion problems. Potential Cropland Study, SCS, U.S. Department of Agriculture, Statistical Bulletin No. 578, pages 4 and 5.

Conversion of agricultural land, in the long run, will limit the food and fiber producing capability of the United States. Greater reliance or marginally productive land will be necessary. Such reliance will require increased technology, including greater use of fuel. fertilizers and presticides, if productive output is to keep pace with the growing U.S. and world populations.

standard. Without such a finding based on substantial evidence, promulgation of health standards will be conducted irresponsibly without regard to the ability of the regulated sector to pay for the present standard and possibly future standards which are more beneficial.

If the Secretary persists in issuing regulations "at will," using only an "economic disaster" test for determination of feasibility, he will effectually be exercising his authority to make important choices of social policy in violation of the non-delegation doctrine.

The economic feasibility requirement of the Occupational Safety and Health Act clearly requires the Secretary to correct his total failure to assess the potential economic impact of the cotton dust standard on cotton farmers.

CONCLUSION

For the reasons stated, the judgment below should be vacated and the case remanded.

Respectfully submitted,

ALLEN A. LAUTERBACH,
General Counsel

C. DAVID MAYFIELD,
Assistant Legal Counsel

American Farm Bureau Federation
225 Touhy Avenue
Park Ridge, IL 60068
(312) 399-5733
Attorneys For *Amicus Curiae*

American Farm Bureau Federation
Amicus Curiae

November 19, 1980

CERTIFICATE OF SERVICE

I hereby certify that copies of the Amicus Curiae Brief of American Farm Bureau Federation In Support of Petitioners in American Textile Manufacturers Institute, Inc., *et al.*, v. Ray Marshall, No. 79-1429 and in National Cotton Council of America v. Ray Marshall, No. 79-1583 were served on

Allen H. Feldman, Esq.
John A. Bryson, Esq.
Office of the Solicitor
Department of Labor
Washington, DC 20210

Wade H. McCree, Jr.,
Solicitor General
U.S. Department of Justice
Washington, DC 20530

Gregory B. Tobin, Esq.
Ogletree, Deakins, Nash,
Smoak, Stewart & Edwards
2920 1st Nat'l Bank Tower
Atlanta, GA 30383

Charles M. Crump, Esq.
Apperson, Crump, Duzane
& Maxwell
Suite 2610
100 North Main Building
Memphis, TN 38103

Neil J. King, Esq.
Wilmer & Pickering
1666 "K" Street, N.W.
Washington, DC 20006

George H. Cohen, Esq.
Bredhoff, Gottesman, Cohen
& Weinberg
1000 Connecticut Avenue,
N.W.
Washington, DC 20036

J. Albert Woll
General Counsel
AFL-CIO
815 15th Street, N.W.
Washington, DC 20005

Robert H. Bork, Esq.
142 Huntington Street
New Haven, CT 06511

this 19th day of November 1980, by first class mail postage prepaid, thereby serving all the parties required to be served in the above consolidated cases.

.....

ALLEN A. LAUTERBACH

Nos. 79-1429, 79-1583

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL.,

Petitioners

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent

NATIONAL COTTON COUNCIL OF AMERICA,

Petitioner

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF OF THE AMERICAN INDUSTRIAL HEALTH COUNCIL AS AMICUS CURIAE

ROBERT C. BARNARD
CLEARY, GOTTLIEB, STEEN & HAMILTON
1250 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 828-3000

Of Counsel:

RICHARD DEC. HINDS
R. BRUCE DICKSON
ERIC C. JEFFREY

Attorneys for The American Industrial Health Council, Inc.

WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

TABLE OF CONTENTS

	Page
INTEREST OF AMICUS CURIAE	2
SUMMARY OF ARGUMENT	3
ARGUMENT	5
I. OSHA FAILED TO COMPLY WITH SECTIONS 3(8) AND 6(b)(5) OF THE ACT IN ISSUING THE COTTON DUST STANDARD	5
A. OSHA Misconstrued the Requirements of Sections 3(8) and 6(b)(5)	5
B. OSHA Failed To Consider Adequately the Alternatives to its Lowest Feasible Approach	8
II. OSHA MUST ASSESS THE COSTS AND BENEFITS OF ITS STANDARD	9
A. The Statutory Language Requires That OSHA Exercise an Informed Judgment Regarding the Effects of its Standard	11
B. The Legislative History Demonstrates That Congress Intended OSHA to Balance the Negative and Positive Effects of Its Standard	13
C. Several Circuits Have Required OSHA to Consider Costs and Benefits	16
D. Administrative Interpretation Supports a Requirement That OSHA Consider Costs and Benefits	17
E. Similar Statutes Have Been Interpreted as Requiring a Cost/Benefit Analysis	18
F. Practical Considerations Demonstrate the Need for a Cost/Benefit Analysis	19
III. OSHA'S INTERPRETATION OF THE ACT PRECLUDED IT FROM ADEQUATELY CONSIDERING ALTERNATIVE APPROACHES, COSTS AND BENEFITS	22
CONCLUSION	25

TABLE OF AUTHORITIES

CASES: Page

American Federation of Labor & Congress of Industrial Organizations v. *Marshall*, 617 F.2d 636 (D.C. Cir. 1979) 6, 7, 9, 10, 19
American Petroleum Institute v. *Occupational Safety & Health Administration*, 581 F.2d 493 (5th Cir. 1978), *aff'd on other gds. sub nom., Industrial Union Department* v. *American Petroleum Institute*, 48 U.S.L.W. 5022 (June 24, 1980) 2, 5, 7, 8, 9, 10, 12, 13, 15, 16, 21, 22, 24
Aqua Slide "N" Dive v. *Consumer Product Safety Commission*, 569 F.2d 831 (5th Cir. 1978) 18
Castle & Cooke Foods, 5 OSHC (BNA) 1435, 1977-78 OSHD (CCH) ¶ 21,854 (1977) 18
Continental Can Co., 4 OSHC (BNA) 1541, 1976-77 OSHD (CCH) ¶ 21,009 (1976) 17
D.D. Bean & Sons v. *Consumer Product Safety Commission*, 574 F.2d 643 (1st Cir. 1978) 18
Dry Color Manufacturers Association v. *Department of Labor*, 486 F.2d 98 (3d Cir. 1973) 9
Florida Peach Growers Association v. *Department of Labor*, 489 F.2d 120 (5th Cir. 1974) 17
Forester v. *Consumer Product Safety Commission*, 559 F.2d 774 (D.C. Cir. 1977) 18
Great Falls Tribune Co., 5 OSHC (BNA) 1443, 1977-78 OSHD (CCH) ¶ 21,844, *appeal docketed*, No. 77-2566 (9th Cir. 1977) 17
Hess & Clark v. *Food and Drug Administration*, 495 F.2d 975 (D.C. Cir. 1974) 12
Industrial Union Department v. *American Petroleum Institute*, 48 U.S.L.W. 5022 (June 24, 1980) 2
KLI, Inc., 6 OSHC (BNA) 1097, 1977-78 (OSHD (CCH) ¶ 22,350 (1977), *appeal dismissed*, 601 F.2d 589 (6th Cir. 1979) 17
Republic Granite Co., Inc., 4 OSHC (BNA) 1711, 1976-77 OSHD (CCH) ¶ 21,167 (1976) 18

TABLE OF AUTHORITIES—Continued

	Page
RMI Co. v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979)	16
Sims v. *United States*, 252 F.2d 434 (4th Cir. 1958), *aff'd*, 359 U.S. 108 (1959)	7
Skidmore v. *Swift & Co.*, 323 U.S. 134 (1944)	7
Turner Co. v. *Secretary of Labor*, 561 F.2d 82 (7th Cir. 1977)	16
United Parcel Service of Ohio, Inc. v. *Occupational Safety & Health Review Commission*, 570 F.2d 806 (8th Cir. 1978)	16
West Point Pepperell, Inc., 5 OSHC (BNA) 1257, 1977-78 OSHD (CCH) ¶ 21,733, *aff'd*, *Marshall* v. *West Point Pepperell*, 588 F.2d 979 (5th Cir. 1979)	17
Worley Brothers Granite Co., 4 OSHC (BNA) 2042 (1977)	18
Zuber v. *Allen*, 396 U.S. 168 (1969)	7

STATUTES AND REGULATIONS:

Consumer Product Safety Act, 15 U.S.C. § 2058 (c)(2)(A)	18
Occupational Safety and Health Act of 1970, 29 U.S.C. § 651 *et seq.*	passim
Section 3(8), 29 U.S.C. § 652(8)	passim
Section 6(b)(5), 29 U.S.C. § 655(b)(5)	passim
Section 6(f), 29 U.S.C. § 655(f)	24
Section 6(g), 29 U.S.C. § 655(g)	13
Standard for Occupational Exposure to Benzene, 43 *Fed. Reg.* 5918 (Feburary 10, 1978)	2
Standard for Occupational Exposure to Cotton Dust, 43 *Fed. Reg.* 27350 (June 23, 1978)	2, 5, 23
Identification, Classification and Regulation of Potential Occupational Carcinogens, 45 *Fed. Reg.* 5002 (January 22, 1980)	2
29 C.F.R. § 1990.142(a)(2), 45 *Fed. Reg.* 5285-5286	6

TABLE OF AUTHORITIES—Continued

	Page
43 *Fed. Reg.* 22254 (May 24, 1978)	21
40 *Fed. Reg.* 19439 (May 5, 1975)	21
MISCELLANEOUS:	
115 Cong. Rec. 22517 (daily ed. Aug. 6, 1969)	13
Currie, *OSHA*, 1976 Am. Bar Foundation Research J. 1107 (1976)	11, 12
COWPS, Comments of the Council on Wage and Price Stability on Proposed Standard for Exposure to Cotton Dust (June 17, 1977)	20
COWPS, Report submitted by the Council on Wage and Price Stability on behalf of the Regulatory Analysis Review Group in regard to the Proposed Standard for Occupational Exposure to Acrylonitrile (May 19, 1978)	20, 21
Legislative History of the Occupational Safety and Health Act of 1970, 92d Cong., 1st Sess. (1971) (Comm. Print)	13, 14, 15, 16
National Academy of Sciences, "Decision Making for Regulating Chemicals in the Environment" (1975)	20
OSHA Press Release, "OSHA Comments on Supreme Court Benzene Decision," July 2, 1980	22
The Shorter Oxford English Dictionary (1944)	12
Webster's New Collegiate Dictionary (1979)	12

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1492

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent

No. 79-1583

NATIONAL COTTON COUNCIL OF AMERICA,

Petitioner

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF OF THE AMERICAN INDUSTRIAL HEALTH COUNCIL AS AMICUS CURIAE

INTEREST OF AMICUS CURIAE

The cotton dust standard [1] is premised upon the same erroneous statutory construction that OSHA followed in the benzene standard [2] and in its recent generic carcinogen regulations.[3] That interpretation has severely restricted OSHA's assesment of workplace hazards and the nature of controls which OSHA claims are required under the Act.

OSHA has, in effect, rewritten the Occupational Safety and Health Act of 1970, 29 U.S.C. §§ 651 *et seq.* (the Act) to delete the statutory language which requires it to consider alternative approaches to risk reduction and to assess the costs and benefits of its standards. In lieu of that language, OSHA has substituted the concept of reducing exposure to the "lowest feasible" level, although those words appear nowhere in the Act. In formulating the cotton dust standard, OSHA applied its "dust control strategy" to require that dust levels be reduced to the lowest feasible level.[4] In issuing the benzene standard and in its generic carcinogen regulations, OSHA has taken the position that Section 6(b)(5) of the Act [5] mandates a risk free level of exposure and, if a risk free level has not been demonstrated to exist or cannot be achieved, the lowest feasible level.

---

[1] Standard for Occupational Exposure to Cotton Dust, 43 *Fed. Reg.* 27350 (June 23, 1978).

[2] Standard for Occupational Exposure to Benzene, 43 *Fed. Reg.* 5918. (February 10, 1978), reviewed *sub nom.* Industrial Union Department v. American Petroleum Institute, 48 U.S.L.W. 5022 (June 24, 1980) (hereinafter cited as "*Benzene*").

[3] Identification, Classification and Regulation of Potential Occupational Carcinogens, 45 *Fed. Reg.* 5002 (January 22, 1980).

[4] 43 *Fed. Reg.* 27358.

[5] Relevant sections of the Act are set forth in Appendix A to this *amicus* brief.

The American Industrial Health Council, Inc. (AIHC) is an organization of 137 companies and 75 participating trade associations representing a wide spectrum of American industry. It was formed specifically to develop a broadly based industrial position in the rulemaking proceedings in which OSHA's generic carcinogen regulations were developed.[6] In that proceeding AIHC proposed an alternative approach for developing standards that did not incorporate OSHA's traditional "lowest feasible level" approach. The final generic carcinogen regulations, however, require that OSHA's erroneous statutory construction be applied in all future occupational safety and health standards relating to carcinogens. The generic regulations are currently being challenged in the courts.[7]

Because of its broad industrial representation and because of its participation in the OSHA generic carcinogen regulations rulemaking, AIHC believes that it's participation as an *amicus* in support of petitioners will give the Court an appreciation of the broader context in which OSHA's erroneous statutory interpretation is being applied.

SUMMARY OF ARGUMENT

AIHC will limit its discussion to the validity of OSHA's "lowest feasible" interpretation. Several issues are raised by OSHA's adherence to its traditional approach.

First, must OSHA consider whether, in light of alternative approaches, its standard is reasonably neces-

---

[6] A list of member companies is attached as Appendix B to this *amicus* brief.

[7] American Industrial Health Council v. Marshall, Civil Action No. H-80-144, Order filed August 5, 1980 (S.D. Tex.), *appeal docketed* August 13, 1980, No. 80-1880 (5th Cir.); American Petroleum Institute v. Occupational Safety and Health Administration, Nos. 80-3018 *et al.* (5th Cir.).

sary or appropriate? Specifically, must OSHA consider the effectivenes of alternatives and whether a significant risk would remain to justify imposing additional controls? Must OSHA consider whether its final standard would achieve a significant reduction in risk from the level that might remain under a less costly alternative? Second, must OSHA determine whether there is a reasonable relationship between the costs and the benefits of its standard?

AIHC submits that these questions should be answered in the affirmative. The Act requires a consideration of the significance of the risk, both at existing exposure levels and at levels occurring under reasonable alternative approaches. OSHA must find, after considering the alternatives and the degree of risk reduction they would achieve, that its standard is reasonably necessary or appropriate to remedy a remaining significant risk of material health impairment.

The Act also requires that a reasonable relationship be demonstrated between the costs and the benefits of the OSHA standard. We do not suggest that OSHA must engage in a strictly quantitative cost/benefit assessment. But as several courts have held, OSHA may not issue a standard until it has evaluated the benefits that will be gained and the resulting costs and has found a reasonable relationship between the two.

OSHA has interpreted the Act as foreclosing consideration of such factors. In its view the Act requires that a "risk free" level of exposure be mandated, or, if there is no known achievable "risk free" level, that exposure be reduced to the lowest feasible level. Because OSHA's interpretation is contrary to the language of the Act and the Congressional intent, it should be expressly rejected by this Court.

Moreover, the Court cannot conclude that OSHA did in fact consider alternative approaches, relative levels of risk, benefits and costs. OSHA's legal interpretation

of the mandate of section 6(b)(5) precluded a meaningful consideration of such factors. The decision of the court below should therefore be reversed.

ARGUMENT

I

OSHA FAILED TO COMPLY WITH SECTIONS 3(8) AND 6(b)(5) OF THE ACT IN ISSUING THE COTTON DUST STANDARD.

A. OSHA Misconstrued the Requirements of Sections 3(8) and 6(b)(5).

The cotton dust standard rests upon an underlying statutory construction identical to the OSHA cancer policy considered by the Court in *Benzene, supra.* OSHA's "dust control strategy" holds that because exposure to cotton dust causes respiratory diseases and because a risk free level of exposure has not been demonstrated, OSHA must mandate controls which will achieve the lowest feasible level. 43 *Fed. Reg.* 27358. In support of its use of this "dust control strategy," OSHA has cited a number of cases in which the OSHA cancer policy was upheld. The carcinogen cases, the Secretary has argued, approved the "determination to set a standard at the lowest feasible level where it was unknown whether a safe threshold for the substance at issue existed." [8]

The basic term "lowest feasible level" upon which OSHA's regulatory decisions are made appears nowhere in the Act. The statutory language provides:

> "The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents un-

---

[8] *See* Brief for the Secretary of Labor, American Federation of Labor & Congress of Industrial Organizations v. Marshall, D.C. Cir. Nos. 78-1562 *et al.*, at 87 (January 26, 1979).

> der this subsection, shall set the standard which *most adequately* assures, *to the extent feasible*, on the basis of the best available evidence, that no employee will suffer *material* impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. . . ." 29 U.S.C. § 655(b)(5) (emphasis supplied).

OSHA has attempted to rewrite this statutory language to include a requirement that exposure be set at the lowest feasible level and to limit its discretion to the issues of technological and economic feasibility wherever a risk free level of exposure cannot be demonstrated. In adopting this "lowest feasible" approach, OSHA has ignored not only Section 3(8), but also the "most adequately assures," "feasible" and "material" language of Section 6(b)(5).[9]

The court below adopted OSHA's interpretation. *American Federation of Labor & Congress of Industrial Organizations* v. *Marshall*, 617 F.2d 636 at 654 (D.C. Cir. 1979). It upheld the "dust control strategy," *i.e.*, the "lowest feasible" requirement, as in accordance with the "special mandate" of the Act. *Id.* at 654-655. The court went on to consider only whether the levels selected were in fact the lowest feasible. *Id.* at 655-662.

Both OSHA and the court below failed to recognize that Sections 3(8) and 6(b)(5) preclude an absolute

---

[9] The impact of OSHA's "lowest feasible" approach is particularly noticeable in the generic carcinogen regulations. There OSHA has required that all standards relating to carcinogens be set at the lowest feasible level, regardless of the carcinogenic potency of the substance being regulated. An extremely weak carcinogen will be regulated to the same degree as an extremely potent carcinogen, without regard to the magnitude of the risk. In addition, if a "suitable substitute" exists, permissible exposure levels will be set at zero, effectively banning the substance. *See* 29 C.F.R. § 1990.142 (a)(2), 45 *Fed. Reg.* 5285-5286.

"lowest feasible" approach to workplace health and safety standards.[10] Section 3(8) provides that standards issued under Section 6(b)(5) will

> "require[] conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." [11]

Section 6(b)(5) requires that the Secretary

---

[10] In interpreting this statute, the courts are entitled to consider the construction which OSHA has placed upon Section 6(b)(5). However, it is beyond question that the "ultimate responsibility" for construing the Act belongs with this Court. Zuber v. Allen, 396 U.S. 168, 192-93 (1969). Agency interpretations "are not absolute rules of law . . . but are only helpful guides to aid courts in their tasks of statutory construction." Sims v. United States, 252 F.2d 434, 438 (4th Cir. 1958), *aff'd*, 359 U.S. 108 (1959). And in considering what, if any, weight should be assigned to an administrative construction, the courts should assess

> "the thoroughness evident in [the agency's] consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control." Skidmore v. Swift & Co., 323 U.S. 134, 140 (1944).

In the *Benzene* decision, a plurality of this Court concluded that, in light the Act and its legislative history, OSHA's contention that it was precluded from distinguishing between significant risks and those of a lesser degree was not entitled to deference. For similar reasons OSHA's lowest feasible interpretation is not entitled to deference.

[11] The court below interpreted this language as an open-ended grant of authority to impose any requirements that could be said to promote a safe workplace, including the rate retention provisions of the cotton dust standard. 617 F.2d at 674. We submit that Section 3(8) was not intended as such an open-ended grant of authority. If it were, the provision would be subject to challenge as an unconstitutional delegation of legislative power. *See Benzene, supra*, Rehnquist, J., concurring.

> ". . . set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity . . ."

In addition to considering health effects, the Secretary must consider "the latest available scientific data in the field," "feasibility," and "experience gained under [the Act] and other health and safety laws." *Id.*

The plain meaning of these provisions, together with the legislative history,[12] demonstrates the error of OSHA's absolute "lowest feasible" approach. The Act requires the Secretary to take into account a number of considerations in addition to the two—safety and feasibility—by which the Secretary believes he is constrained. Moreover, Congress did not equate "safe" with "risk free," as OSHA does. As this Court held in *Benzene*, the Act, when read as a whole, authorizes the Secretary to issue standards only when they are reasonably necessary or appropriate to remedy significant risks of material health impairment.

B. OSHA Failed To Consider Adequately the Alternatives to its Lowest Feasible Approach.

In this case the textile industry proposed a comprehensive alternative approach to reduce the risk of material health impairment to a level which the industry contended was insignificant. When OSHA has been given a comprehensive, detailed alternative approach, supported by substantial evidence, it cannot find that its lowest feasible approach is reasonably necessary or appropriate without a careful consideration of the alternative.[13] If

---

[12] *See* Part II, *infra*.

[13] AIHC does not suggest that OSHA is required to perform a detailed risk assessment and cost/benefit analysis for every conceivable alternative. However, where a party has proposed a reasonable alternative or where other alternative approaches exist,

an alternative approach would reduce the risk to an insignificant level at a lower cost, then the OSHA standard would not be reasonably necessary or appropriate to remedy a significant risk. Moreover, if OSHA believes that a significant risk would remain under the alternative, it must find that that risk will be significantly reduced by its standard.[14]

Because of the Secretary's "lowest feasible" approach, OSHA failed to consider whether the final cotton dust standard was reasonably necessary or appropriate—in light of the industry alternative—to remedy a significant risk of material health impairment or to achieve a significant reduction in the risk that would remain under the industry alternative. The decision below should therefore be reversed.

II

OSHA MUST ASSESS THE COSTS AND BENEFITS OF ITS STANDARD.

The court below explicitly declared that OSHA is not obligated to undertake any cost/benefit analysis in support of its standards or even to consider whether the costs which would be imposed by such standards are reasonably commensurate with the benefits which they are expected to provide. 617 F.2d 636, 662-664. This holding was based in large part upon the conclusion that the requirement in Section 3(8) of the Act that an OSHA standard be "reasonably necessary or appropri-

---

the "reasonably necessary or appropriate" finding cannot be made without a thorough evaluation of such approaches. *See*, Dry Color Manufacturers Association v. Department of Labor, 486 F.2d 98, 107 (3d Cir. 1973).

[14] *Compare Benzene, supra*, Powell, J., concurring, 48 U.S.L.W. at 5037.

ate" imposes no constraints upon the agency's rulemaking authority. *Id.* at 663, 664 n.166. According to the court below, the only limit upon OSHA's authority to issue standards is OSHA's criterion of "feasibility." *Id.* at 663. Under OSHA's interpretation, upheld by the court below, a standard is not economically infeasible unless it threatens the survival of the affected industry as a whole. *Id.* at 661-62.

This interpretation is directly contrary to the intent of the Act. The statutory language and legislative history clearly indicate that Congress intended OSHA to consider the costs and the benefits of its workplace standards. Only standards which are reasonable—in terms of the benefits they will achieve and the costs they will impose—are authorized by the Act. Although OSHA's reasoning has been adopted by some courts, it has been rejected by others and has been repudiated by the Commission which Congress created to review the application of OSHA's standards in enforcement proceedings.

In the *Benzene* decision, this Court confirmed that the Act does not contemplate the creation of risk free workplaces. Rather, Congress intended that OSHA attempt to eliminate only significant risks.[15] By interpreting Sections 3(8) and 6(b)(5) of the Act as requiring that OSHA standards be issued only to eliminate or reduce "significant" risks, the Court made it clear that OSHA was not bound by a rigid formula in which there was no room for agency judgment. Instead, OSHA must analyze the risk and determine whether it is significant and whether the proposed standard will achieve a significant reduction.

Findings regarding significant risk and whether a standard is reasonably necessary or appropriate and

---

[15] *See Benzene, supra,* 48 U.S.L.W. at 5031 (plurality), 5037 (Burger, C.J., concurring), 5038 (Powell, J., concurring).

feasible cannot be made in the abstract. Congress expected the agency to assess the propriety of its standards in relation to their benefits and costs.[16]

A. The Statutory Language Requires That OSHA Exercise an Informed Judgment Regarding the Effects of its Standard.

Section 3(8), which defines the term "standard," mandates that standards must be "reasonably necessary or appropriate to provide safe or healthful employment and places of employment." 29 U.S.C. § 652(8). The use of the relative terms "reasonably necesary or appropriate" indicates that the decision whether to regulate a particular risk was intended to be primarily a question of evaluation and informed judgment. Congress clearly did not intend to create a statutory scheme calling for the sound exercise of administrative judgment, yet deliberately predetermine for OSHA the level of protection to be imposed by its standards.[17]

Further support for this interpretation may be found in Congress' use of the term "safe or healthful." Like "reasonably necessary or appropriate", this language also does not speak in absolutes. Neither "safe" nor "health-

---

[16] In urging that OSHA must consider both costs and benefits in determining whether its standards are "feasible" and "reasonably necessary or appropriate", AIHC is not suggesting that the Act places the Secretary in a mathematical straitjacket. Whether costs are commensurate with benefits is largely a question of expert judgment enlightened by an evaluation of the facts, subject to appropriate judicial review.

[17] *See* Currie, *OSHA*, 1976 Am. Bar Foundation Research J. 1107, 1134. (Section 3(8) "does not simply require whatever is 'necessary' to achieve the requisite level of safety, it requires what is 'reasonably necessary or appropriate.'" And "[w]hat is 'appropriate' may be what is desirable in light of feasibility or costs; what is 'reasonably necessary' may be what is both necessary and reasonable.")

ful" is the equivalent of "risk-free." *See e.g., Benzene, supra,* 48 U.S.L.W. at 5031 (plurality); 5037 (Burger, C.J., concurring); 5038 (Powell, J., concurring). Accordingly, there is a need for the exercise of reasoned and informed judgment in determining what is "safe or healthful." *See* Currie, *supra,* at 1134. As Judge Leventhal explained in the context of drug safety, a determination of what is safe "inevitably means calculating whether the benefits which the drug produces outweigh the costs of its restricted use." *Hess & Clark* v. *Food & Drug Administration,* 495 F.2d 975, 993-94 (D.C. Cir. 1974).

That OSHA was directed to weigh costs and benefits as part of its standard setting process is also confirmed by a reading of Section 6 as a whole. That section requires the Secretary to set standards so as to "most adequately" assure, as far as "feasible", that employees will not suffer "material" impairment. The use of those terms indicates that a balancing of various competing values was contemplated. Although one meaning of the term "feasible" is "capable of being done," it is also defined as being synonymous with such terms as "practicable," "suitable" and "reasonable." *Webster's New Collegiate Dictionary* (1979); *The Shorter Oxford English Dictionary* (1944). The legislative history demonstrates that it was the latter sense of the word "feasible" that Congress had in mind when it created the Act.

Moreover, factors which the Secretary was directed by Section 6 to take into account in setting standards include, in addition to health considerations, "the latest available scientific data," "feasibility" of the standard and "experience gained under this and other health and safety laws." Inclusion of these factors provides further indication that Congress expected OSHA standards to

be the result of an informed exercise of agency judgment.[18]

B. The Legislative History Demonstrates That Congress Intended OSHA to Balance the Negative and Positive Effects of Its Standard.

The legislative history of the Act demonstrates that Congress intended OSHA to limit its concern to significant risks which it could significantly reduce. *See Benzene*, 48 U.S.L.W. at 5032-34 (plurality); 5037 (Burger, C.J., concurring); 5038 (Powell, J., concurring). As Mr. Justice Powell also recognized, this same legislative history supports, if not compels, the conclusion that Congress did not anticipate or authorize the imposition of standards whose costs are grossly disproportionate to the benefits which they offer. *Id.* at 5038 (Powell, J., concurring).

The requirement of feasibility was added to Section 6(b)(5) in the Senate Labor and Public Welfare Committee as a compromise to allay the minority's concerns that the bill would impose absolute requirements upon OSHA and would not permit a consideration of such issues as reasonableness and practicality.[19] The bill was

---

[18] It should also be noted that Section 6(g) of the Act explicitly directs OSHA to set priorities for its regulations so that the more serious hazards will be addressed first. This implicitly requires the Agency to assess both costs and benefits in setting priorities. *Benzene, supra*, 48 U.S.L.W. at 5031 n.49. It is unlikely that Congress would decree OSHA to consider such factors in determining when to regulate but purposely preclude the Agency from taking the same factors into account in deciding how to regulate.

[19] The original administration bill, authored by Senator Javits, required an independent board to render what he described as "a report on the feasibility" of proposed standards. 115 Cong. Rec. 22517 (daily ed., Aug. 6, 1969). As so used, feasibility was to include technical feasibility, reasonableness and practicality. S. 2193, reprinted in *Legislative History of the Occupational Safety and*

accordingly amended so as to mandate that "[t]he Secretary . . . shall set the standard which most adequately and feasibly assures . . . that no employee will suffer any impairment of health or functional capacity." *Leg. Hist.* at 242.

Subsequent changes in the bill were made so that it would be acceptable to those who had insisted upon a requirement of reasonableness. Senator Dominick, among others, was concerned with the use of the absolute term "any" and with the placement of the term "feasibly," which, as written, could have been construed so as to make the bill impractical and unworkable. Thus, Senator Dominick stated,

> "No job can be rendered perfectly safe, and no employee can be rendered perfectly secure from injury. . . . It is unrealistic to attempt, as this section apparently does, to establish a utopia free from any hazards." *Leg. Hist.* at 480.

Citing possible interpretations of this language, Senator Dominick was concerned that it might be applied to require that health hazards be prevented despite the impractical social and economic costs of doing so. He suggested that the bill might be interpreted as authorizing a standard designed to prevent mosquito and fly bites, *Leg. Hist.* at 345, or as requiring that the risk of an automobile accident be eliminated for a bus driver. *Id.* at 423. Senator Dominick stated that the section

> "could be read to require the Secretary to ban all occupations in which there remains *some* risk of injury, impaired health, or [diminished] life expectancy . . . . In addition, in many cases, the

---

Health Act of 1970, ("*Leg. Hist.*") 92d Cong., 1st Sess., 38-39 (1971) (Comm. Print). Although Senator Javits failed in his attempt to get the independent board concept accepted, his feasibility requirement was adopted by the Committee.

> standard which might most 'adequately' and 'feasibly' assure the elimination of the danger would be the prohibition of the occupation itself." *Leg. Hist.* at 367 (emphasis in original).

Because of these concerns, Senator Dominick sponsored an amendment which substituted the word "material" for the word "any" and which replaced the word "feasibly" with the term "to the extent feasible." This, he stated, was an accurate description of the Committee's original intent. He described that intent as follows:

> "What we were trying to do in the bill—unfortunately, we did not have the proper wording or the proper drafting—was to say that when we are dealing with toxic agents or physical agents, we ought to take such steps as are *feasible and practical* to provide an atmosphere within which a person's health or safety would not be affected." *Leg. Hist.* at 502 (emphasis added).[20]

Other Senators also expressed views indicating that cost considerations were to be taken into account. Senator Yarborough noted that the amended section required "reasonable safety standards." *Leg. Hist*, at 512. Senator Williams, a sponsor of the bill, declared that:

> "[o]ur bill is fair and reasonable. It is a good-faith effort to balance the needs of workers to have a sa[f]e and healthy work environment against the

---

[20] By describing the mandated steps as those that are "feasible and practical," Senator Dominick demonstrated that the use in section 6(b)(5) of the word "feasible" was intended to encompass the criteria of technical feasibility, reasonableness and practicality contained in Senator Javits' bill. *See* note 19, *supra*. This statement not only indicates that Congress desired practical and reasonable standards based upon a consideration of costs and benefits, but also refutes OSHA's contention that a special, high degree of control was mandated for toxic substances. *See Benzene, supra*, 48 U.S.L.W. at 5033 n.54 (plurality).

requirement of industry to function without undue interference." *Leg. Hist.* at 435.

As Mr. Justice Powell noted, "[t]here could be no such 'balance' if OSHA were authorized to impose standards without regard to economic consequences short of serious dislocation." *Benzene, supra,* 48 U.S.L.W. at 5038 n.5.

C. Several Circuits Have Required OSHA to Consider Costs and Benefits.

Although there is a conflict among the circuits as to whether OSHA must consider the costs and the benefits of its standards, a number of circuits have rejected OSHA's inflexible interpretation of the Act and have required that the agency estimate the expected health benefits and determine that they bear a reasonable relationship to the anticipated costs.[21] *See American Petroleum Institute* v. *Occupational Safety & Health Administration,* 581 F.2d 493 (5th Cir. 1978), *aff'd on other gds. sub nom., Industrial Union Department* v. *American Petroleum Institute,* 48 U.S.L.W. 5022 (June 24, 1980); *RMI Co.* v. *Secretary of Labor,* 594 F.2d 566 (6th Cir. 1979); *United Parcel Service of Ohio, Inc.* v. *Occupational Safety & Health Review Commission,* 570 F.2d 806 (8th Cir. 1978); *Turner Co.* v. *Secretary of Labor,* 561 F.2d 82 (7th Cir. 1977);[22] *Florida Peach Growers*

---

[21] Those courts which have found that no balancing obligation exists have, like the court below, failed to recognize the "reasonably necessary or appropriate" language as imposing a limitation on OSHA's discretion to issue standards.

[22] The court below attempted to distinguish *Turner* on the ground that it involved a non-fatal hazard, but did not suggest a statutory basis for such distinction. Although the *Turner* court did note that noise was not life-threatening, it did so only in the context of deciding whether, in that particular case, the risk was sufficiently large to justify the costs of compliance (which were, by comparison with the cotton dust standard, relatively modest). There was no suggestion in *Turner* that the balancing approach

Association v. *Department of Labor*, 489 F.2d 120 (5th Cir. 1974).

D. Administrative Interpretation Supports a Requirement That OSHA Consider Costs and Benefits.

The Occupational Safety and Health Review Commission ("OSHRC" or the "Commission"), an expert body set up by Congress to oversee OSHA enforcement actions and to prevent abuses of power by the agency, has also rejected OSHA's interpretation. In *Continental Can Co.*, 4 OSHC (BNA) 1541, 1976-77 OSHD (CCH) ¶ 21,009 (1976), the Commission rejected OSHA's interpretation of the term "feasible" as permitting the imposition of whatever costs are necesssary to eliminate identified hazards so long as the expenditures for each hazard can be borne without putting the employer's financial condition in jeopardy. The Commission stated that:

> "Clearly, employers have finite resources available for use to abate health hazards. And just as clearly if they are to be made to spend without limit for abatement of this hazard their financial ability to abate other hazards, including life threatening hazards, is reduced." 4 OSHC (BNA) at 1547, 1976-77 OSHD (CCH) at 25,256.

The Commission has consistently taken the position that OSHA's "massive dislocation" interpretation is at odds with the overall intent of the Act.[23]

---

was to be limited to such non-life threatening hazards. Indeed, the court's definition of the term "feasible" as meaning "practicable" demonstrates that a balancing of costs and benefits is required for all standards to which the term "feasible" applies.

[23] *See, e.g., KLI, Inc.*, 6 OSHC (BNA) 1097, 1977-78 OSHD (CCH) ¶ 22,350 (1977), *appeal dismissed*, 601 F.2d 589 (6th Cir. 1979); *West Point Pepperell Inc.*, 5 OSHC (BNA) 1257, 1977-78 OSHD (CCH) ¶ 21,733 (1977), *aff'd, Marshall* v. *West Point Pepperell*, 588 F.2d 979 (5th Cir. 1979); *Great Falls Tribune Co.*, 5

E. Similar Statutes Have Been Interpreted as Requiring a Cost/Benefit Analysis.

Courts have interpreted other, similar statutes as requiring agencies to consider both costs and benefits and to attempt to balance the two. The Consumer Product Safety Act, which requires that Consumer Product Safety standards be "reasonably necessary to eliminate or reduce an unreasonable risk of injury . . .," 15 U.S.C. § 2058(c)(2)(A), has been interpreted as requiring the Consumer Product Safety Commission (CPSC) to balance costs and benefits in making its decisions. *See Aqua Slide "N" Dive* v. *Consumer Product Safety Commission*, 569 F.2d 831, 839, 844 (5th Cir. 1978); *D.D. Bean & Sons* v. *Consumer Product Safety Commission*, 574 F.2d 643 (1st Cir. 1978).[24] A similar result was reached by the D.C. Circuit with respect to the Federal Hazardous Substances Act in *Forester* v. *Consumer Product Safety Commission*, 559 F.2d 774, 789 (D.C. Cir. 1977).

The court below, in an attempt to evade the logic of this comparison, distinguished the statutes which CPSC administers because of their use of the term "unreasonable risk" in comparison with the "safe or healthful employment and places of employment" language of Section 3(8). However, in *Aqua Slide* and in *D.D. Bean, supra*, the courts rested their conclusion upon the "reasonably necessary" language of the Consumer Product Safety Act, which is identical to the language found in Section

---

OSHC (BNA) 1443, 1977-78 OSHD (CCH) ¶ 21,844, *appeal docketed*, No. 77-2566 (9th Cir. 1977); *Castle & Cooke Foods*, 5 OSHC (BNA) 1435, 1977-78 OSHD (CCH) ¶ 21,854 (1977); *Worley Brothers Granite Co.*, 4 OSHC (BNA) 2042 (1977); *Republic Granite Co., Inc.*, 4 OSHC (BNA) 1711, 1976-77 OSHD (CCH) ¶ 21,167 (1976).

[24] "Only after the existence of a hazard and the likelihood of its reduction at a reasonable cost have been established by the Commission may it be said that [its] requirements are *'reasonably necessary.'*" 574 F.2d at 649 (emphasis supplied).

3(8). Moreover, little significance can be attributed to the omission of the term "unreasonable risk" in the Act. Obviously, Congress did not intend, by using the term "safe," to require the elimination of "reasonable" risks.

F. Practical Considerations Demonstrate the Need for a Cost/Benefit Analysis.

In rejecting petitioners' contention that OSHA is obligated to balance reasonably the costs and benefits of its standards, the court below pointed to what it considered to be the practical shortcomings and uncertainties associated with the use of cost/benefit analysis. In so doing, the court misconceived the nature of the analysis which the agency was being asked to perform.[25] And more importantly, it failed to perceive that the refusal to attempt any balancing will, in the long run, result in a misallocation of resources and a lower degree of both total worker protection and societal well-being.

The courts that have recognized the requirement of a cost/benefit analysis have not required the Secretary to quantify every cost and benefit or to engage in a formal cost/benefit assessment. Although quantification should be attempted as far as possible, the Secretary is only required to identify and assess the various costs and benefits of a proposed standard and of reasonable alternatives to the extent practicable in a given case. Surely no less can be expected of any rational decision-making process. None of the cases cited above have demanded a

---

[25] The court interpreted petitioner's claim that OSHA must keep some proportion between the costs and benefits of its standards as a demand that the Agency be able to support its standard by reference to a formal, quantifiable cost/benefit analysis. 617 F.2d at 662. This, it feared, would reduce the agency's responsibility to that of merely providing a quantification of risks and benefits and deciding whether the benefit/cost ratio was greater than unity. *Id.* at 665. The court clearly misconceived the type of cost/benefit analysis which the Act contemplates.

more formal cost/benefit assessment. It is clear that such an analysis would not unduly constrain OSHA in making its regulatory decisions.[26]

Moreover, there are limited resources for meeting safety needs, and there are other societal values that must not be foresaken. As the Council on Wage and Price Stability (COWPS) explained in its comments on the proposed cotton dust standard:

> "To the extent that the costs of a proposed regulation exceed the benefits, resources would be withdrawn from other markets where their use is valued more highly. This lessens the overall efficiency with which society's resources are used and dampens the prospects for improvements in productivity." Comments of the Council on Wage and Price Stability on Proposed Standard for Exposure to Cotton Dust at 4 (June 17, 1977).[27]

See also the COWPS comments on the OSHA acrylonitrile standard:

> ". . . [R]isks are just one element of the total work environment. An attempt to equalize one aspect of an interrelated system will inevitably lead to inequalities in the other aspects such as wages, job security, fringe benefits and perhaps risks from other

---

[26] As the National Academy of Sciences has explained, such an analysis

> "is not a rule or formula which would make the decision or predetermine the choice for the decisionmaker. Rather, it refers to the systematic analysis and evaluation of alternative courses of action drawing upon the analytical tools and insights provided by economics and decision theory. It is a framework and a set of procedures to help organize the available information." National Academy of Sciences, "Decision Making for Regulating Chemicals in the Environment," 39 (1975).

[27] COWPS also stated:

> ". . . [T]he usefulness of cost-effectiveness analysis can only be realized when alternative approaches to standard setting are fully considered." *Id.* at 23.

types of hazards." Report Submitted by the Council on Wage and Price Stability on behalf of the Regulatory Analysis Review Group in regard to the Proposed Standard for Occupational Exposure to Acrylonitrile at 20 (May 19, 1978).

Thus, the refusal to perform cost/benefit analysis or to balance the benefits and costs may well be to the ultimate detriment of the very workers that OSHA is enjoined to protect.

Failure to balance costs and benefits will also have other untoward social effects. Worker safety is only one of a myriad of socially desirable goals. A risk free workplace can be pursued only at the expense of not pursuing other aims. Certainly Congress, when it enacted the Act, did not intend to prevent American industry from remaining competitive internationally or from continuing to provide employment for the nation's workforce. *See Benzene, supra,* 48 U.S.L.W. at 5038 n.6 and accompanying text (Powell, J. concurring).

In addition, cost/benefit analyses are used regularly by several other agencies in making regulatory decisions. The Environmental Protection Agency, for example, performs cost/benefit analyses under a number of the statutes which it administers. Except where limited by specific congressional mandates, such as the Delaney Clause, the Food and Drug Administration also utilizes cost/benefit analyses to ascertain the safety of products falling within its jurisdiction. The Nuclear Regulatory Commission has adopted a monetary value for exposure reduction and has praised the use of cost/benefit analysis in defining levels of radiation exposure "as low as is reasonably achievable." [28]

Cost/benefit analysis is a useful and necessary part of decision-making, whether private or regulatory. Al-

---

[28] 40 *Fed. Reg.* 19439 (May 5, 1975); 43 *Fed. Reg.* 22254 (May 24, 1978).

though there are uncertainties involved in trying to use cost/benefit comparisons, they are still an invaluable tool. This Court should not espouse an interpretation of the Act which would deny the agency and affected employers and employees the benefits of a clear consideration of the benefits to be derived from a standard, together with the resulting costs.

III

OSHA'S INTERPRETATION OF THE ACT PRECLUDED IT FROM ADEQUATELY CONSIDERING ALTERNATIVE APPROACHES, COSTS AND BENEFITS.

In its response to the petitions for *certiorari*, OSHA referred to the preamble to the cotton dust standard and suggested that it has satisfied the *Benzene* requirement of a finding of significant risk and of a significant reduction in risk.[29] A careful review of the OSHA decision below, as well as its benzene standard and its generic carcinogen regulations, however, demonstrates that the agency has consistently made its regulatory decisions on the basis of its rigid lowest feasible interpretation without regard to the level of risk or to the reduction in risk.

OSHA apparently views this Court's ruling in *Benzene* regarding its authority to regulate only "significant" risks as requiring merely a formality. In OSHA's words,

> "A plurality of the Court has now concluded that OSHA failed to make an adequate formal finding that the standard would remedy a significant health risk." [30]

---

[29] Brief for the Federal Respondents at 5, n.4.

[30] "OSHA Comments on Supreme Court Benzene Decision," OSHA press release, July 2, 1980 at 1.

While conceding that a "formal finding" is now required, OSHA suggested that it would continue to regulate to the lowest feasible level. It explained:

> ". . . [W]e intend to press forward in regulating benzene, as well as in regulating other cancer causing and toxic substances in order to provide to employees the level of protection called for by the statute." [31]

In light of OSHA's consistent interpretation of Section 6(b)(5), it is clear that the agency contemplates that it need do no more than render meaningless "formal findings," while continuing to do what it believes it must do under the Act—require that exposure be reduced to the lowest feasible level. The Act, in OSHA's view, does not require *or permit* a consideration of various risk levels or of costs and benefits. Thus OSHA cannot now claim that it performed the assessment or made the findings that the Act requires. Such considerations have been foreclosed by OSHA's consistent interpretation of its authority under Section 6(b)(5).

The inconsistency between OSHA's discussion of costs and benefits and its interpretation of the Act is obvious. The agency suggested in its preamble that "a systematic evaluation of costs and benefits," is "to be encouraged." Yet in the same paragraph OSHA states that its standards "must assure maximum benefit . . . *constrained only by the limits of feasibility.*" 43 *Fed. Reg.* 27378 (emphasis supplied). Clearly, a cost/benefit an-

---

[31] *Id.* at 2. *See also,* the government's reply brief in *Benzene,* where OSHA urged the Court to accept its understanding of the Congressional intent:

> "There is nothing unreasonable about a legislative determination that *requires* standards to be set as low as technologically and economically feasible . . . ." Reply Brief for the Federal Parties at 21 (emphasis supplied).

alysis can play no meaningful part if feasibility is the only constraint.

Similarly, OSHA's discussion of various studies cannot be considered to be an evaluation of alternative levels of risk. If no risk free level is known, OSHA is required by its reading of the Act to reduce exposure levels to the lowest feasible level. The extent to which the standard reduces the risk—indeed whether the standard significantly reduces the risk—is irrelevant to OSHA.

Although the agency has sugested that, in setting its standard at the lowest feasible level, it is making a discretionary decision regarding appropriate exposure levels,[32] OSHA's words must not obfuscate the necessary consequences of its legal interpretation. Under its reading of Section 6(b)(5), OSHA's only policy decisions involve questions of feasibility. Costs are relevant only to show economic feasibility, as OSHA defines the term. Benefits and relative levels of risk are irrelevant.[33] This narrow and fundamentally incorrect view of what Congress intended OSHA to do under the Act has fatally infected the agency's approach to this rulemaking.

The Court should recognize OSHA's reference to "formal findings" and its cost-benefit language as an attempt, *ex post facto*, to make its lowest feasible standard appear to comply with the Act. Any findings regarding significant risks and the balance between costs and benefits must be "supported by substantial evidence in the record considered as a whole." 29 U.S.C. § 655(f). In light of OSHA's interpretation, the only findings it could have

---

[32] 43 *Fed. Reg.* 27379.

[33] *See, Benzene*, plurality opinion, 48 U.S.L.W. at 5033, n.58 ("The Government also states that it is OSHA's policy to attempt to quantify benefits wherever possible. While this is certainly a reasonable position, it is not consistent with OSHA's own view of its duty under § 6(b)(5). In light of the inconsistencies of OSHA's position and the legislative history of the Act, we decline to defer to the Agency's interpretation.") *See also, Id.* at 5029, n.39.

made were limited to the narrow range of factual issues that interpretation left open. OSHA cannot now contend that it made other findings based upon the record, when its interpretation precluded the consideration of such issues. Hence OSHA could not have made the findings or analysis required by the Act.

CONCLUSION

For the foregoing reasons, AIHC submits that the decision of the court below should be reversed, and the court below should be directed to remand the record to OSHA for reconsideration.

Respectfully submitted,

ROBERT C. BARNARD
CLEARY, GOTTLIEB, STEEN & HAMILTON
1250 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 828-3000

Counsel for The American Industrial Health Council, Inc.

Of Counsel:

RICHARD DEC. HINDS
R. BRUCE DICKSON
ERIC C. JEFFREY

APPENDICES

APPENDIX A

STATUTORY PROVISIONS

Section 3(8) of the Occupational Safety and Health Act of 1970 (the Act) provides:

> The term "occupational safety and health standard" means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment. (29 U.S.C. § 652(8))

Section 6(b)(5) of the Act provides:

> The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired. (29 U.S.C. § 655(b)(5))

Section 6(f) of the Act provides:

> Any person who may be adversely affected by a standard issued under this section may at any time prior to the sixtieth day after such standard is promulgated file a petition challenging the validity of such standard with the United States court of appeals for the circuit wherein such person resides or has his principal place of business, for a judicial review of such standard. A copy of the petition shall be forthwith transmitted by the clerk of the court to the Secretary. The filing of such petition shall not, unless otherwise ordered by the court, operate as a stay of the standard. The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole. (29 U.S.C § 655(f))

Section 6(g) of the Act provides:

> In determining the priority for establishing standards under this section, the Secretary shall give due regard to the urgency of the need for mandatory safety and health standards for particular industries, trades, crafts, occupations, busineses, workplaces or work environments. The Secretary shall also give due regard to the recommendations of the Secretary of Health, Education, and Welfare regarding the need for mandatory standards in determining the priority for establishing such standards. (29 U.S.C. § 655 (g))

APPENDIX B

MEMBER COMPANIES

AMERICAN INDUSTRIAL HEALTH COUNCIL

Air Products & Chemicals, Inc.
Allen Extruders, Inc.
Allied Chemical Corp.
American Acrylic Corp.
American Chemical & Refining Co., Inc.
American Cyanamid Co.
American Hoechst Corp.
AMOCO Chemical Corp.
Apollo Colors, Inc.
ARCO Chemical Co.
Ashland Chemical Co., Div. of
Ashland Oil, Inc.
Badische Corp.
Birchwood Laboratories, Inc.
Boehringer Ingelheim, Ltd.
Borg-Warner Chemicals, Div. of
Borg-Warner Corp.
Bristol-Myers
Buffalo Color Corp.
Burlington Industries, Inc.
Burroughs Wellcome Co.
Carstab Corp.
Carus Corp.
Celanese Corp.
Champion International Corp.
Chattem, Inc.
Chemical Exchange Co., Inc.
Chemplex Co.
Chevron Chemical Co.
Ciba-Geigy Corp.
Cities Service Co.
Conoco Chemicals Co.

Cordova Chemical Co.
Coulton Chemical Corp.
Cyclo Chemicals Corp.
Diamond Shamrock Corp.
Dixie Chemical Co.
Dow Chemical, U.S.A.
Dow Corning Corp.
E. I. du Pont de Nemours & Co.
Eastman Kodak Co.
El Paso Products Co.
Essex Chemical Corp.
Ethyl Corp.
Exxon Chemical Co., U.S.A.
Firestone Tire & Rubber Co.
First Chemical Corp.
FMC Corp.
Frederick Gumm Chemical Co., Inc.
General Electric Co.
Georgia Pacific Corp.
Goodrich Chemical Co., B.F.
Goodyear Tire & Rubber Co.
W.R. Grace & Co.
Grantham, Inc.
Great American Chemical Corp.
Great Lakes Carbon Corp.
Guardian Chemical Corp.
Gulf Oil Corp.
Halcon Research & Development Corp.
Heatbath Corp.
Henkel Corp.
Hercules, Inc.
Hoffman-La Roche, Inc.
Hooker Chemicals, & Plastics Corp.
Hughson Chemicals, Lord Corp.
ICI Americas, Inc.
International Minerals & Chemical Corp.
Kamco Plastics, Inc.

Kay-Fries, Inc.
Kenrich Petrochemicals, Inc.
Koppers Company, Inc.
Linden Chemicals and Products, Inc.
Loctite Corp.
Mallinckrodt, Inc.
Merck & Co., Inc.
Merichem Co.
Mobay Chemical Corp.
Mobil Chemical Co.
Monsanto Co.
Mooney Chemicals, Inc.
Morton Chemical
NALCO Chemical Co.
National Distillers & Chemical Corp.
Nepera Chemical Co., Inc.
Neville Chemical Co.
Northern Petrochemical Co.
Olin Corp.
Owens-Corning Fiberglas Corp.
Penick Corp.
Pennwalt Corp.
Petrolite Corp.
Pfister Chemical Corp.
Pfizer, Inc., Chemicals Div.
Phillips Chemical Co., Div. of
Phillips Petroleum Co.
Pilot Chemical Co.
Pope Chemical Corp.
PPG Industries, Inc.
Pressure Vessel Services, Inc.
Procter & Gamble Co.
Reilly Tar & Chemical Corp.
Republic Steel Corp.
Resources Conservation and Recovery Corp.
Revlon Foundation
R. J. Reynolds Industries, Inc.

Rhone Poulenc, Inc.
Rohm & Haas Co.
Ruetgers-Nease Chemical Co., Inc.
Saban Electric Corp.
Schering Plough Corp.
Shell Chemical Co.
SOLTEX Polymer Corp.
Specialty Products Co.
Standard Oil Co. (Ohio)
Stauffer Chemical Co.
R. R. Street and Co., Inc.
Sun Chemical Corp.
SunOlin Chemical Co.
Sunset Plastic Products
Tenneco Chemicals, Inc.
3M Co.
Paul Uhlich & Co.
Union Carbide Corp.
U.S. Borax
United States Steel Corp.
Univar Corp.
R. T. Vanderbilt Co., Inc.
Velsicol Chemical Corp.
Virginia Association of Launderers and Cleaners, Inc.
Virginia Chemicals, Inc.
Vulcan Materials Co., Chemicals Div.
Witco Chemical Corp.

LIMITED

Ansul Co., The
Certainteed Corp.
Ferro Corp.
Fisher Scientific Co.
National Steel Corp.
Norton Co.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRING MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., and WEST POINT-PEPPERELL, INC.,
Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,
Respondent.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

MOTION OF AMERICAN IRON AND STEEL INSTITUTE FOR LEAVE TO FILE BRIEF *AMICUS CURIAE* IN SUPPORT OF PETITIONERS

and

BRIEF OF AMERICAN IRON AND STEEL INSTITUTE *AMICUS CURIAE* IN SUPPORT OF PETITIONERS

JEROME POWELL
Counsel of Record
W. SCOTT RAILTON
REED SMITH SHAW & MCCLAY
1150 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 457-6131

BARTON C. GREEN
General Counsel
American Iron and Steel Institute
1000 16th Street, N.W.
Washington, D.C. 20036
(202) 452-7143

Of Counsel:

DAVID FERBER
REED SMITH SHAW & MCCLAY
1150 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 457-6117

November 20, 1980

PRESS OF BYRON S. ADAMS PRINTING, INC., WASHINGTON, D. C.

No. 1429

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRING MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., and WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

On Writ of Certiorari to the United States Court of Appeals For the District of Columbia Circuit

MOTION OF AMERICAN IRON AND STEEL INSTITUTE FOR LEAVE TO FILE BRIEF *AMICUS CURIAE* IN SUPPORT OF PETITIONERS

The American Iron and Steel Institute, a nonprofit trade association with a membership which includes 63 domestic iron and steel producing companies, moves for leave to file a brief, amicus curiae, in support of

the petitioners. This motion is accompanied by the written consent of the Solicitor General for the respondents and by the written consents of some of the petitioners. While counsel for each of the petitioners have orally consented to the filing of this brief, written consents have not been received from all of the petitioners.

As set forth more fully in the attached brief, the American Iron and Steel Institute's interest arises from the fact that the American steel industry, unlike the petitioners in this case, is substantially affected by numerous OSHA health and safety regulations pursuant to § 6(b) of the OSH Act. In the light of the economic problems now facing the basic steel industry, this Court's application and interpretation of the terms "to the extent feasible" and "the feasibility of the standards" in § 6(b)(5) of the OSH Act, 29 U.S.C. 655(b)(5), and "reasonably necessary or appropriate" in § 3(8) of that Act, 29 U.S.C. 652(8), are crucial to the industry. The parties are unlikely to present to this Court the effect its interpretation of these statutory terms will have on an industry subject to numerous OSHA regulations.

Respectfully submitted,

DAVID FERBER

November 20, 1980

TABLE OF CONTENTS

	Page
STATEMENT OF INTEREST	2
SUMMARY OF ARGUMENT	7
ARGUMENT	8
CONCLUSION	12

TABLE OF AUTHORITIES

CASES:

Industrial Union Dept. AFL-CIO v. *American Petroleum Institute,* 48 USLW 5022 (July 2, 1980) . . 3, 9, 12

Texas Independent Ginners Ass'n v. *Marshall,* Nos. 78-2663, etc. (5th Cir. Nov. 14, 1980) 6, 9

United Steelworkers of America, AFL-CIO v. *Marshall,* No. 79-1048 (D.C. Cir. Aug. 15, 1980) 6, 7, 8, 10, 11

STATUTES AND RULES:

Clean Air Act, as amended, 42 U.S.C. § 7401, *et seq.* . . 4

Clean Water Act, as amended, 33 U.S.C. § 1251, *et seq.* 4

Occupational Safety and Health Act,

29 U.S.C. 655(b)(5) (1970), § 6(a), § 6(b)(5) . . 2, 3, 4, 6

29 U.S.C. 652(8) (1970), § 3(8) 2, 3

29 C.F.R. 1910 . . . . . 3, 4

43 Fed. Reg. 54480-82 (1978) 10

43 Fed. Reg. 54494 (1978) 8

45 Fed. Reg. 36962 (1980) 4

45 Fed. Reg. 36971 (1980) 3

45 Fed. Reg. 37648 (1980) 3, 4

45 Fed. Reg. 37649 (1980) 3

Table of Authorities Continued

Page

MISCELLANEOUS:

American Iron and Steel Institute, *Steel at the Crossroads: The American Steel Industry in the 1980s.* (Jan. 1980) 5, 6

Annual Statistical Report, AMERICAN IRON AND STEEL (1979) 5

Council on Wage and Price Stability, Catalog of Federal Regulations Affecting Iron and Steel Industry, December, 1976 p. IV. 4, 5

Environmental Protection Agency's Carcinogen Assessment Group "List of Carcinogen," April 22, 1980 3

Registry of Toxic Effects of Chemical Substances NIOSH, as contained in the Environmental Protection Agency National Institutes of Health Chemical Information System (July 1979), referred to at 45 Fed. Reg. 53673 (1980) 3

Report to the President by the Steel Tripartite Advisory Committee on the U.S. Steel Industry (Sept. 24, 1980) 5, 6

No. 1429

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY, ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRING MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., and WEST POINT-PEPPERELL, INC.,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR,

Respondent.

On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

BRIEF OF AMERICAN IRON AND STEEL INSTITUTE *AMICUS CURIAE* IN SUPPORT OF PETITIONERS

STATEMENT OF INTEREST OF AMERICAN IRON AND STEEL INSTITUTE *AMICUS CURIAE*

American Iron and Steel Institute (AISI) is a non-profit trade association with a membership that includes sixty-three domestic iron and steel producing companies. These companies employ some 449,000 persons in their steel producing and fabricating operations and possess approximately 92% of the raw steel producing capability in the United States. AISI is participating in rulemaking and litigation concerning the standard proposed by the Occupational Safety and Health Administration (OSHA) for occupational exposure to lead because that standard has had and will continue to have a direct impact on certain steel industry operations. AISI's interest in the instant case stems from the consonance of legal issues presented in the cotton-dust and lead-standard litigations and the potential precedential effect of this litigation on the interpretation and application of the Occupational Safety and Health Act (OSH Act) generally.

Crucial to the American iron and steel industry will be this Court's application and interpretation of the terms "to the extent feasible" and "the feasibility of the standards" in § 6(b)(5) of the OSH Act, 29 U.S.C. 655(b)(5), and "reasonably necessary or appropriate" in § 3(8) of that Act, 29 U.S.C. 652(8). If the view of the court below should be sustained that these terms require no more of OSHA than a determination that the costs of the standard will not bankrupt the regulated industry, the American steel industry will be dealt a severe blow. This is because the steel industry is or expects to be subject to numerous OSHA health and safety regulations promulgated pursuant to § 6

(b),[1] including those dealing with coke oven emissions,[2] asbestos,[3] noise,[4] benzene,[5] lead,[6] carbon monoxide (CO),[7] sulphur dioxide (SO_2),[8] heat stress,[9] iron oxide,[10] benzo (a)pyrene,[11] naphthylamine,[12] and trichloroethlene,[13] all of which are expected materially to affect the manufacture of steel or subsidiary operations. Also, of concern to the steel industry are current OSHA standards adopted pursuant to § 6(a), to which the "reasonably necessary or appropriate" language of § 3(8) seems equally applicable. These include various of the subjects as to which § 6(b) stand-

---

[1] § 6(b)(5) of the OSH Act containing the "feasibility" language clearly covers health standards and may also cover safety standards. See *Industrial Union Dept. AFL-CIO* v. *American Petroleum Institute,* 48 USLW 5022, 5023, n. 1 (July 2, 1980) (*Benzene*).

[2] 29 CFR 1910.1029 (1977).

[3] 29 CFR 1910.1001 (1976), 45 Fed. Reg. 36971 (1980).

[4] 29 CFR 1910.95 (1974), 45 Fed. Reg. 36962 (1980).

[5] 29 CFR 1910.1026 (1978), invalidated by *Industrial Union Department, AFL-CIO* v. *American Petroleum Institute,* 48 USLW 5022 (July 2, 1980).

[6] 29 CFR 1910.1025 (1979), 45 Fed. Reg. 63476 (1980).

[7] 29 CFR 1910.1000, Table Z-1, 45 Fed. Reg. 37648 (1980).

[8] 45 Fed. Reg. 37649 (1980).

[9] Registry of Toxic Effects of Chemical Substances NIOSH, as contained in the Environmental Protection Agency National Institutes of Health Chemical Information System (July, 1979), referred to at 45 Fed. Reg. 53673 (1980).

[10] Id.

[11] Environmental Protection Agency's Carcinogen Assessment Group "List of Carcinogens," April 22, 1980, referred to at 45 Fed. Reg. 53673 (1980).

[12] Id.

[13] Id.

ards are anticipated, such as exposure to noise,[14] carbon monoxide,[15] sulphur dioxide,[16] electrical standards,[17] and standards respecting walking and working surfaces,[18] as well as other possible hazards, such as exposure to acid mist,[19] coal dust,[20] and dusts (total).[21] The § 6(b) standards, as adopted or proposed, are almost uniformly more expensive for the industry than the "consensus" or "established Federal" safety and health standards with respect to the same subject matters that have been previously adopted by OSHA pursuant to § 6(a) of the OSH Act, although the latter standards have resulted in substantial compliance costs.

At the same time the industry is subjected to these heavy expenses of compliance with OSHA regulations, it is subject to the burdensome costs of complying with the Clean Air Act, 42 U.S.C. § 7401 *et seq.*, and the Clean Water Act, 33 U.S.C. § 1251, *et seq.*, as well as to numerous other Federal regulations. By reason of such regulations, the Council on Wage and Price Stability reported:

> "Steel is an industry whose production procedures are to some extent prescribed for it by government, whose costs are substantially influenced by government, whose market share exists at the sufferance of government and whose profitability

---

[14] 29 CFR 1910.95 (1974), 45 Fed. Reg. 36962 (1980).

[15] 29 CFR 1910.1000 Table Z-1.

[16] Id.

[17] 29 CFR 1910.308-309, 45 Fed. Reg. 37648 (1980).

[18] 29 CFR 1910.21-34, 45 Fed. Reg. 37648 (1980).

[19] 29 CFR 1910.1000 Table Z-1.

[20] Id. at Table Z-2.

[21] Id. at Table Z-3.

> has a good deal less to do with innovation and enterprise than it does with what government decides to let it keep."[22]

Over the past several years, the basic American steel industry has been characterized by production far below capability, by low or negative rates of return, and by declining employment. During the most recent four calender quarters for which data is available, the second quarter of 1979 to the second quarter of 1980, the major integrated steel producers suffered a decline of 63% in corporate profits, with outright losses in steelmaking operations as a result of escalating costs and underutilization of facilities.[23] From 1970 to 1979 employment by American companies in the production and sale of steel products declined by 15%, from 531,000 to 453,000.[24] Not coincidently, imports of steel have increased both absolutely and proportionately during the past three decades. In the early 1950s steel imports represented 1.8% of domestic sales; by 1978 that figure had grown ten-fold to 18.1%.[25]

---

[22] Council on Wage and Price Stability, *Catalog of Federal Regulations Affecting Iron and Steel Industry*, December, 1976, at iv.

[23] *Report to the President by the Steel Tripartite Advisory Committee on the U.S. Steel Industry*, (Sept. 24, 1980) at 1. Co-chaired by the Secretaries of Labor and Commerce and comprised of government, labor, and industry leaders, the Steel Triparitite Advisory Committee submitted findings on the steel industry and recommendations for its revitalization to President Carter. These recommendations provided the basis for President Carter's program for the industry, announced on September 30, 1980.

[24] Annual Statistical Report, AMERICAN IRON AND STEEL INSTITUTE 1979, p. 21.

[25] *American Iron and Steel Institute, Steel at the Crossroads: The American Steel Industry in the 1980s* (Jan. 1980) (hereinafter "Steel at Crossroads") at 9.

Modernization of facilities is the key to the industry's recovery but this will require enormous capital expenditures over the next five years. The Steel Tripartite Committee has examined this matter and has concluded that when the industry's capital needs for modernization and for meeting environmental and health requirements are compared to available capital resources for the critical 1980-84 period a shortfall of 1.7 to 2 billion dollars annually results.[26]

It must be added that the economic problems confronting the steel industry and inflation and persistent balance of payments deficits, among other things, bear testimony to a malaise in the American economy in general and in basic industries in particular. It is against this economic backdrop that OSHA's cotton dust standard—and specifically the agency's treatment of the economic feasibility issue—must be judged.

AISI's participation in the on-going proceedings to establish a health standard for occupational exposure to inorganic lead has served to focus the steel industry's attention on the legal issues presented to this Court in the instant case. In the lead standard proceeding OSHA, with approval of the Court of Appeals of the District of Columbia Circuit,[27] has determined among other things that it has the power under § 6 (b)(5) of the Act to force whole industries to convert their basic manufacturing facilities from traditional to novel and untried technologies because the latter

---

[26] This estimate represents a consensus reached with Treasury Department representatives on the Steel Tripartite Advisory Committee. STC Report at 8. Industry estimates of the capital shortfall are in fact somewhat larger. See *Steel at the Crossroads, supra,* at 50.

[27] *United Steelworkers of America, AFL-CIO* v. *Marshall,* No. 79-1048 (D.C. Cir. Aug. 15, 1980) (*Lead*).

may, in OSHA's view, achieve some health gains for employees. OSHA further concluded, again with the approval of the Court of Appeals, that the unknown but unquestionably vast dollar expenditures required to effect these changes in fundamental technology and manufacturing processes did not render the standard economically infeasible because, as here, it did not appear that the costs imposed by the standard would bankrupt the affected industries.

While Certiorari will be sought in *Lead*, this Court's disposition of this case may establish precedents which both will affect the disposition of some of the issues in *Lead* and will resolve critical questions concerning the meaning and application of the OSH Act generally. For the reasons already indicated and developed further herein, the proper resolution of these questions here is a matter of the gravest concern to the American steel industry.

SUMMARY OF ARGUMENT

The criteria applied by OSHA and the court below to determine that the cotton dust standard is economically feasible are clearly inadequate. They confer on OSHA an unfettered power to impose costs on affected industries and to direct the allocation of their capital resources without regard to the realities of today's economy. In so doing, they inescapably raise grave questions of unconstitutional delegation of legislative power. The constitutional questions can be avoided and the American economy can be spared the imposition of unnecessary costs by a reading of the OSH Act which compels OSHA to justify the costs of its standards.

ARGUMENT

In the language of the Court of Appeals, OSHA's determination that the cotton dust standard was economically feasible rested on the agency's "conclusion that the standard will not put the industry out of business." [28] (Pet. App. 69). In *Lead, supra,* the Court of Appeals further explicated its understanding of the term "economic feasibility." The Court said (per Chief Judge Wright):

> "A standard is feasible if it does not threaten 'massive dislocation' to, *AFL-CIO* v. *Brennan, supra,* 530 F.2d at 123, or imperil the existence of, *American Iron and Steel Institute* v. *OSHA, supra,* 577 F.2d at 836, the industry . . . . More specifically, *Industrial Union Dept., AFL-CIO* v. *Hodgson, supra,* teaches us that the practical question is whether the standard threatens the competitive stability of an industry, 499 F.2d at 478, or whether any inter-industry discrimination in the standard might wreck such stability or lead to undue concentration . . . ." Slip Opinion at 143-44.

We submit that this reading of feasibility is both practically and legally deficient. Practically it fails

---

[28] OSHA does recognize that the costs of a given standard are not to be viewed in complete isolation. In its preamble to the lead standard the agency stated its position as follows:

> "Costs from other sources, including other OSHA standards, have been considered in the same manner as any other known costs facing an industry. As such they become part of the economics of the industry from which the likely impact of the lead standard is measured." 43 Fed. Reg. 54494 (Nov. 21, 1978).

As indicated from the quotation from the lead standard case in the text, *supra,* however, the "likely impact" of a proposed OSHA standard sufficient to restrain OSHA is the virtual bankruptcy of the affected industry.

because at a time when American industry cannot tolerate unnecessary additions to its costs, it imposes on OSHA no real obligation to justify the costs of its regulations. Legally it fails because, bankruptcy of the affected industry aside, it furnishes no guidelines for the exercise of OSHA's regulatory discretion.

Of course, it is implicit in the adoption of the OSH Act that the American economy will bear the costs of upgrading the safety and health of the industrial workplace. However, as this Court noted in *Benzene, supra,* 48 USLW at 5033, 34, both the language of the OSH Act and its legislative history make plain that Congress did not wish to confer on OSHA a limitless authority over the American economy.

Just such a limitless delegation of authority is achieved, however, by the construction given to the term "feasible" by OSHA with the approval of the court below.[29] So long as industry bankruptcy is avoided, OSHA is left free to decree whatever changes in the domestic economy it feels may contribute to an improvement in the health or safety of the industrial workplace.

OSHA's lead standard discloses the extent to which such an unbridled discretion can be carried. Compliance with that standard among other things will require the primary lead industry to convert its basic manufacturing processes from a pyrometallurgical technology to a new and unproven hydrometallurgical

---

[29] But cf. *Texas Independent Ginners Ass'n* v. *Marshall,* Nos. 78-2663, etc., (5th Cir. Nov. 14, 1980) Slip Opinion 1208, 1225 n. 50:

> "The economic feasibility aspect of the statutory limitation requires that OSHA regulations must be affordable and also must be of practical cost."

technology.[30] OSHA does allow the industry ten years in which to achieve the conversion, but this regulatory magnanimity serves only to underscore the scope of the power asserted. OSHA's justification for the ten-year compliance period is its recognition that the technology to meet the standard exists today in embryonic form only.[31] Thus, the standard requires the industry to invest its capital resources in the pursuit of an unproven technology which OSHA has selected for it and this without any real assurance that the health objective of the standard can be achieved through the new technology.[32]

OSHA's authority to preempt core managerial decisions regarding changing to different manufacturing technologies is directly at issue in the *Lead* case but is not present, as such, in the instant case. OSHA's assertion in *Lead*, on the other hand, of the power to direct the allocation of corporate resources to the pursuit of specific new technologies does bear directly on the cotton dust standard. Indeed, the lead standard takes OSHA's assertion of authority one step farther than the instant case. Here, the expenditures which the standard would require of the industry are, by and large, hygenic in nature (improved ventilation, enclosure of equipment, etc.). In *Lead* the agency claims the power to direct the expenditure of cor-

---

[30] 43 Fed. Reg. 54480-82 (Nov. 21, 1978).

[31] *Id.* The Court of Appeals found the ten-year compliance period consoling. It said:

> "OSHA's technology-forcing strategy, and its reliance on embryonic schemes for compliance, are particularly reasonable in the light of such a generous phase-in period." *Lead, supra,* Slip Opinion at 172.

[32] See the Court of Appeals' discussion of the new technology, *id.* at 174.

porate funds in areas—selection of manufacturing technologies for example—that lie wholly outside the agency's statutory competence solely because the agency believes that there *may* be some beneficial side effects from the expenditures.

This is limitless discretion. It is discretion exercised without reference to meaningful guidelines and without the possibility of effective judicial oversight. This is not regulation; it is legislation.

To avoid the constitutional consequences of such a sweeping delegation of power, the Act must be construed to impose realistic limitations on OSHA's feasibility determinations. We believe that this objective is achieved if the agency is required to demonstrate that its standards impose on industry no greater costs than are necessary for the responsible discharge of the agency's regulatory function. This would include a showing that the benefits to be derived from the standard will bear some reasonable relationship to their anticipated costs and that the standard represents a cost-efficient mode of achieving those benefits. The court below explicitly rejected this construction of the Act here (Pet. App. 69-77) and in *Lead, supra,* Slip Opinion at 140, n. 102.

The parties will address the statutory bases for the construction of the Act which they advocate. It suffices to repeat here that the construction placed on the term "feasible" by OSHA and the court below serves neither to restrain OSHA in the selection of health-improvement alternatives nor to provide meaningful guidelines for the exercise of the agency's discretion. Short of industry bankruptcy, OSHA is left free to direct the application of massive corporate resources

to achieve minimal or speculative health gains. Such a construction of the Act raises inescapably those questions of unconstitutional delegation of legislative power foreseen in *Benzene, supra,* 48 USLW at 5032.

CONCLUSION

The unfettered discretion which OSHA has fashioned for itself, with the approval of the court below, to direct the restructuring of whole industries in the name of safety and health raises inescapably the most serious constitutional questions. However, there is nothing in either the terms of the Act or its legislative history or its overall purpose to suggest that Congress intended to confer any such far-reaching authority on OSHA. To the contrary, as this Court observed in *Benzene, supra,* 48 USLW at 5033, 34, there is clear evidence of a Congressional purpose to circumscribe OSHA within reasonable bounds. This goal can be achieved and difficult constitutional questions can be avoided if the Act is read to impose practical and objective limitations on OSHA's economic feasibility determinations.

At a minimum these limits should include obligations to perform cost-benefit and cost-efficiency analyses. Nothing less will suffice to confine OSHA to a regulatory as opposed to a legislative role and to insure that the costs to the American economy of the OSH Act are not wholly disproportionate to the safety and health benefits to be derived from it.

Respectfully submitted,

JEROME POWELL
Counsel of Record
W. SCOTT RAILTON
REED SMITH SHAW & MCCLAY
1150 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 457-6131

BARTON C. GREEN
General Counsel
American Iron and Steel Institute
1000 16th Street, N.W.
Washington, D.C. 20036
(202) 452-7143

Of Counsel:

DAVID FERBER
REED SMITH SHAW & MCCLAY
1150 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 457-6117

November 20, 1980

No. 79-1429, No. 79-1583

MICHAEL ROD

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., *Petitioners,*

v.

F. RAY MARSHALL, SECRETARY OF LABOR, ET AL., *Respondents.*

NATIONAL COTTON COUNCIL OF AMERICA, *Petitioner,*

v.

F. RAY MARSHALL, SECRETARY OF LABOR, ET AL., *Respondents.*

On Writs Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF ASARCO INCORPORATED AS AMICUS CURIAE

WILLIAM J. KILBERG
Counsel of Record

STEPHEN E. TALLENT
KENNETH W. STARR
1776 G Street, N.W.
Washington, D.C. 20006
(202) 789-8500

Of Counsel:

H. FREDERICK TEPKER
WILLIAM R. HYDE, JR.
GIBSON, DUNN & CRUTCHER

PRESS OF BYRON S. ADAMS PRINTING, INC., WASHINGTON, D.C.

TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

TABLE OF AUTHORITIES ii

INTEREST OF AMICUS CURIAE 1

ARGUMENT 4

The Decision Of The District Of Columbia Court Of Appeals In The Cotton Dust Case Interprets The Occupational Safety And Health Act So As To Grant OSHA Unreviewable Discretion And Unconstitutional Legislative Authority 4

A. Introduction 4

B. The "Feasibility" Requirement of the Statute 8

C. Evisceration of the "Substantial Evidence" Rule 12

D. The Doctrine of Nondelegation 17

E. Conclusion 23

TABLE OF AUTHORITIES

CASES: PAGE

American Federation of Labor & Congress of Industrial Organizations, AFL-CIO v. *Brennan*, 530 F.2d 109, 121 (3d Cir. 1975) 6, 11 n.7

American Federation of Labor & Congress of Industrial Organizations v. *Marshall*, 617 F.2d 636 (D.C. Cir. 1979)..... 3, 6, 7, 8, 9, 10, 12 & n.8, 13, 14, 17, 21, 23

American Iron and Steel Institute v. *OSHA*, 577 F.2d 825 (3d Cir. 1978) 11 n.7

Arizona v. *California*, 373 U.S. 546 (1963) 20

Ashwander v. *TVA*, 297 U.S. 288 (1936) 7

Atlas Roofing Co. v. *OSHA*, 430 U.S. 442 (1977) ... 21 n.14

Chiarella v. *United States*, _____ U.S. _____, 100 S. Ct. 1108 (1980) 5

Citizens to Preserve Overton Park, Inc. v. *Volpe*, 401 U.S. 402, 416 (1971) 13 n.9

Ernst & Ernst v. *Hochfelder*, 425 U.S. 185 (1976)..... 5

General Electric Co. v. *Gilbert*, 429 U.S. 125 (1976) 5

Industrial Union Department, AFL-CIO v. *American Petroleum Institute*, _____ U.S. _____, 100 S. Ct. 2844 (1980)..... 2, 9, 13 & n.9, 14, 15, 15-16 n.11, 19 n.13, 21 n.14, 23

Industrial Union Department v. *Hodgson*, 162 U.S. App. D.C. 331, 499 F.2d 467 (1974) 17

Marshall v. *Barlow's Inc.*, 436 U.S. 307 (1978) 21 n.14

National Lime Association v. *EPA*, 627 F.2d 416, 430, 451 n. 126 (D.C. Cir. 1980) 13 n.9

Panama Refining Co. v. *Ryan*, 293 U.S. 388 (1935)..... 19

Piper v. *Chris-Craft Industries, Inc.*, 430 U.S. 1 (1977).. 5

RMI Co. v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979) 7 n.3

Texas Independent Ginners Association v. *Marshall*, No. 78-2663 (5th Cir. Nov. 14, 1980)..... 6, 7 n.3, 11 n.7, 14 n.10, 18 n.12, 23 n.15

Table of Authorities Continued

CASES: PAGE

Turner Co., Division of Olin Corp., 561 F.2d 82 (7th Cir. 1977) 7 n.3

United Air Lines, Inc. v. *McMann*, 434 U.S. 192 (1977) . 5

United States v. *Robel*, 389 U.S. 258, 276 (1967) 20

United Steelworkers of America, AFL-CIC CLC v. *Marshall*, No. 79-1048 (D.C. Cir. Aug. 15, 1980) ... 2 & n.1, 3, 6, 7, 8 & n.4, 9, 10 & n.6, 12, 13, 15-16 n.11, 16, 17, 18 n.12, 20, 21, 23

Universal Camera Corp. v. *N.L.R.B.*, 340 U.S. 474 (1951) 15

Universal Oil Products Co. v. *Root Refining Co.*, 328 U.S. 575, 581 (1946) 3

Vermont Yankee Nuclear Power Corp. v. *Natural Resources Defense Council, Inc.*, 435 U.S. 519 (1978) 15 n.11

Whirlpool Corp. v. *Marshall*, 445 U.S. 1 (1980) .. 17, 21 n.14

STATUTES AND REGULATIONS:

Occupational Safety and Health Act of 1970, 29 U.S.C. §§651-78 1

29 U.S.C. §655(b)(5) ..... 3, 5, 8, 10 & n.6, 19, 21, 23

29 C.F.R. §1910.1001(d)(2)(iv)(c) 17

29 C.F.R. §1910.18 ..... 9 n.5

Table of Authorities Continued

MISCELLANEOUS: PAGE

Address by OSHA Assistant Secretary Eula Bingham, [1979] OSHA Rep. (BNA) 1690 (Apr. 26, 1979) 3

J. Ely, Democracy and Distrust, a Theory of Judicial Review 131-34 (1980) 5

O. Freedman, Crisis and Legitimacy: The Administrative Process and American Government 93 (1973) 20

H. Friendly, The Federal Administrative Agencies 21-22 (1962) 21

L. Tribe, American Constitutional Law 288 (1978)..... 20

Wright, *Beyond Discretionary Justice,* 81 Yale L.J. 575, 582-87 (1972) 5

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429
AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., ET AL., *Petitioners,*
v.
F. RAY MARSHALL, SECRETARY OF LABOR, ET AL., *Respondents.*

No. 79-1583
NATIONAL COTTON COUNCIL OF AMERICA, *Petitioner,*
v.
F. RAY MARSHALL, SECRETARY OF LABOR, ET AL., *Respondents.*

On Writs Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

---

BRIEF OF ASARCO INCORPORATED AS AMICUS CURIAE

INTEREST OF AMICUS CURIAE

ASARCO is a leading smelter and refiner of non-ferrous metals. As such, it is directly affected by many occupational safety and health regulations promulgated by the Secretary of Labor under the Occupational Safety and Health Act of 1970, 29 U.S.C. §§651-78 ("the Act"), and has a direct interest both in the substantive provisions of such regulations and in the standards and procedures governing their adoption. ASARCO is a party to two judicial proceedings involving a review of OSHA health standards: No. 78-1959 and consolidated cases in the United States Court of Appeals for the

Ninth Circuit, for review of OSHA's inorganic arsenic standard; and No. 79-1048 and consolidated cases in the United States Court of Appeals for the District of Columbia Circuit, for review of OSHA's inorganic lead standard (the *Lead Case*).[1]

ASARCO believes that the issues presented in the case at bar are highly important to substantial segments of U.S. industry, in addition to the textile industry, inasmuch as fundamental questions as to the extent of OSHA's authority under the Act have been raised by OSHA's promulgation of unprecedented and far-reaching health standards.

OSHA has gone very far in its recent substantive health standards. The present case raises serious legal issues as to one such standard. But this case is not alone, and it should not be viewed by this Court in isolation. Rather, the cotton dust standard is part of a continuum involving the earlier benzene standard which this Court struck down last Term, *Industrial Union Department, AFL-CIO* v. *American Petroleum Institute*, _____ U.S. _____, 100 S. Ct. 2844 (1980) (the "*Benzene*" case), and the later lead standard. The recent Court of Appeals' decisions in this case and the *Lead Case* have improperly vested OSHA with sweepingly broad authority

---

[1] The Court of Appeals for the District of Columbia has rendered a decision in the Lead Case, upholding the lead standard for the major lead industries but remanding the record to OSHA for reconsideration of the economic and technological feasibility of the lead standard as it applied to other industries. United Steelworkers of America, AFL-CIO-CLC v. Marshall, No. 79-1048 (D.C. Cir. Aug. 15, 1980). The major lead industries intend to file a petition for writ of certiorari with this Court and, in the interim, have sought a stay of the lead standard.

to do whatever the agency wants.[2] And what OSHA wants, it is now clear, is to require industry to comply with unworkable health standards just so long as the entire industry would not be driven out of business by compliance with any *single* standard, regardless of the cumulative effects of all applicable OSHA standards to the industry (*Cotton Dust*), and to force industry to meet standards as to which no technology exists or looms on the horizon (*Lead Case*). This is agency discretion and power run riot.

The lower court's decisions point toward bedrock questions about the delegation of authority permitted by the Act. This brief is addressed to one of the questions certified by this Court in granting the writs of certiorari: whether the "feasibility" requirement embodied in Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5), *as interpreted by the Court of Appeals* unconstitutionally delegates legislative power to OSHA.

ASARCO files this brief *amicus curiae* both in its own interest as a subject of far-reaching and unsupportable OSHA standards and to further "the public interest in the administration of justice," *Universal Oil Products Co.* v. *Root Refining Co.*, 328 U.S. 575, 581 (1946), given the extraordinary actions of a critical government agency which has seriously affected the stability and well-being of large segments of American industry.

Written consents from all parties to the filing of this brief are on file with the Clerk.

---

[2] See Assistant Secretary and OSHA Administrator Eula Bingham's blunt assertion in a 1979 speech, that OSHA is not "prohibited from doing just about anything we want to do." Address by Assistant Secretary Bingham to ABA Institute on Law, Science and Technology in Health Risk Regulation (April 20, 1979), reported at [1979] OSHA Rep. (BNA) 1690 (Apr. 26, 1979).

ARGUMENT

The Decision Of The District Of Columbia Court Of Appeals In The Cotton Dust Case Interprets The Occupational Safety And Health Act So As To Grant OSHA Unreviewable Discretion And Unconstitutional Legislative Authority.

A. Introduction

In the last two decades, Congress has established a number of single-purpose administrative agencies and vested them with broad rule-making and adjudicatory powers. These agencies, in contrast to the broad-mission departments or agencies created in earlier years, have typically been charged with implementing a single policy goal or purpose. Agencies have been created, for example, to regulate or promote the quality of the environment, the availability of equal employment opportunity, the safety of consumer products, the safety of automobiles, and of concern in the present case, safety and health in the workplace — the province of OSHA.

The pursuit by the several agencies of government of their respective single purposes has frequently been characterized by an exclusive regulatory focus upon the statutorily prescribed goal or purpose to be accomplished — such as assurance of healthy and safe workplaces — with limited consideration given by such agencies to competing interests and choices at work in implementing Congress' purpose. Their mission has also been not infrequently undertaken with only a begrudging application of procedural requirements to assure fairness and reasonableness of agency action. This tendency to expand agency power in pursuit of the congressionally articulated goal has not gone unnoticed by the commen-

tators. *J. Ely, Democracy and Distrust, a Theory of Judicial Review* 131-34 (1980); Wright, *Beyond Discretionary Justice*, 81 Yale L.J. 575, 582-87 (1972). Nor has this agency tendency gone unnoticed by this Court. *Cf. Chiarella* v. *United States*, _____ U.S. _____, 100 S. Ct. 1108 (1980); *United Air Lines, Inc.* v. *McMann*, 434 U.S. 192 (1977); *Piper* v. *Chris-Craft Industries, Inc.*, 430 U.S. 1 (1977); *General Electric Co.* v. *Gilbert*, 429 U.S. 125 (1976); *Ernst & Ernst* v. *Hochfelder*, 425 U.S. 185 (1976).

This judicially recognized tendency of regulatory agencies is of particular constitutional significance, as well as of practical importance to the U.S. economy, with respect to agencies' exercise of their rulemaking powers — a legislative function carried out by regulators under a statutory framework created by Congress. Indeed, the confluence of several regulatory agencies' exercise of their respective powers has substantial economic effects upon firms, like ASARCO, carrying on business in the contemporary regulatory environment. U.S. industries typically find themselves regulated by several, and sometimes many, single-purpose agencies, each with a single perspective that is being enforced and implemented as vigorously as possible, without analysis or even consideration of the economic effects of regulatory requirements imposed by sister agencies. Regulation is accomplished in a vacuum, with a single goal in mind.

The vesting of power in the various regulatory agencies has typically been accomplished by Congress' enactment of a broadly worded statute. Thus, at issue in the present case is the provision in OSHA's statutory framework requiring that health standards governing the workplace be "feasible." Section 6(b)(5), 29 U.S.C. § 655(b)(5). The absence of definitional guidance in the

Act permits the regulatory agency, and ultimately the courts, to identify and give specific meaning to the criteria or considerations encompassed in the statutory terms, "feasible" and "feasibility."

The Court of Appeals in *Cotton Dust*, *American Federation of Labor & Congress of Industrial Organizations* v. *Marshall*, 617 F.2d 636 (D.C. Cir. 1979), and subsequently in the *Lead Case*, has ruled upon the agency's determination as to the meaning of "feasibility." The Court in both cases sustained the agency's sweeping definition of "feasibility," namely that OSHA's health standards were valid since, in *Cotton Dust*, the standard would not result in the economic demise of the entire industry, and since, in the *Lead Case*, the standard *might* be technologically achievable in a period of ten years for a *typical* firm *in most of its operations*, even though no technology capable of achieving OSHA's standard presently existed nor did any such technology even "loo[m] on today's horizon." *American Federation of Labor & Congress of Industrial Organizations, AFL-CIO* v. *Brennan*, 530 F.2d 109, 121 (3d Cir. 1975). *Compare Texas Independent Ginners Association* v. *Marshall,* No. 78-2663 (5th Cir. Nov. 14, 1980) (holding that technological feasibility "demands that OSHA requirements must be achievable with existing, nearly developed or available technology"). Slip opinion at 1225 n. 49.

Without question, OSHA's definition of "feasibility" in both cases is extreme. But a more fundamental problem exists than merely a particular agency's unprecedented interpretation, as upheld by the Court of Appeals. What is ultimately at question is whether the Court of Appeals' interpretation of the "feasibility" requirement renders the Act, as construed, an impermissi-

ble delegation of legislative power. For the effect of the decision below is to confer unbridled power upon this single-purpose agency to do whatever it wants to do, so long as an entire industry is not driven out of business by implementation of that single standard by that single agency (*Cotton Dust*), or to require industry to do whatever OSHA wants it to do, even though the technology neither exists nor looms on the horizon, with the effect that ASARCO's plants, and those of other smelters, will have to be rebuilt from the ground up (*Lead Case*).

This sweeping power granted to a single-function agency under the approach of the Court of Appeals constitutes, in our view, a conferral upon the agency of core legislative power reserved to Congress. Specifically, the construction of the statute by the Court of Appeals improperly delegates the essential legislative functions of fashioning and articulating basic industrial policy to a regulatory agency which is neither answerable nor responsible to the public. To that extent, the statute is, as construed by the Court of Appeals, an unconstitutional delegation of legislative power. This Court should therefore reject the Court of Appeals' approach — which leaves "feasibility" utterly void of meaning — in order to obviate the necessity otherwise of squarely facing the constitutional issue of improper delegation. *Cf. Ashwander* v. *TVA*, 297 U.S. 288 (1936).[3]

---

[3] Other courts in construing the "feasibility" requirement have appropriately cabined what otherwise would be unbridled discretion vested in OSHA with respect to the "feasibility" requirement. *See, e.g.*, Texas Independent Ginners Ass'n v. Marshall, *supra*; RMI Co. v. Secretary of Labor, 594 F.2d 566 (6th Cir. 1979); Turner Co., Div. Of Olin Corp. v. Secretary of Labor, 561 F.2d 82 (7th Cir. 1977).

B. The "Feasibility" Requirement Of The Statute

The pertinent portion of the regulatory scheme at issue in both *Cotton Dust* and the *Lead Case* can be briefly summarized. With respect to health standards in the workplace, Section 6(b)(5) of the Act provides that OSHA is to set a standard which best protects workers "to the extent feasible" and that "feasibility" must be a factor in fashioning a health standard. "Feasibility," as indicated above, is not defined by the Act. Not only is the statute silent in this respect, so too the legislative history sheds little light on the meaning of this critical statutory concept. Further, no standards or considerations governing "feasibility" are enumerated in the statute or clearly articulated in the legislative history.

The Court of Appeals in the *Lead Case* was not unaware of Congress' silence. As noted by Chief Judge Wright in that case:

> On this crucial matter [of feasibility] . . . Congress has said no more. The conventional arts of statutory construction are of little help in understanding such scant language, especially where the legislative history is virtually silent. Maj. opinion at 141.

Lacking specific guidance from Congress,[4] the Court of Appeals in the *Lead Case* resorted to two sources for imbuing the barebones "feasibility" concept with meaning: first, judicial glosses on the term, and second, the views of the agency itself. In our view, the Court of Appeals

---

[4] As the Court of Appeals observed in the Lead Case, maj. op. at 141 n. 103, the legislative history provides limited insight into what Congress had in mind with respect to the meaning of feasibility. Senator Javits' reference to the feasibility requirement, however, certainly suggests that the term has more meaning than that given it by the Court of Appeals.

then abdicated the judicial function and, through its interpretation of the key statutory terms, "feasibility" and "feasible," permitted OSHA to achieve an unsupportable and extraordinary result.

OSHA has recently formulated a series of health standards in various industries, all of which raise fundamental questions as to the statutory term, "feasibility." This Court reviewed the benzene standard only last Term. *Industrial Union Department, AFL-CIO* v. *American Petroleum Institute, supra.* The instant case raises for the second time in this Court the validity *vel non* of a substantive health standard (cotton dust) promulgated by OSHA; in the *Lead Case*, still another sweeping OSHA health standard is at issue.[5]

The benzene, cotton dust and lead cases have a common theme. OSHA has promulgated, over industry objections, far-reaching and unprecedented health standards. The standard in *Benzene* was struck down, correctly, by this Court. The standards in *Cotton Dust* and the *Lead Case*, threatening as they do the economic viability of major segments of U.S. industry, deserve the

---

[5] Since the validity of the arsenic standard (29 C.F.R. § 1910.18) has not been ruled upon by the Ninth Circuit, this brief will not address in any detail the facts of that case. We would urge the Court however to keep in mind that that standard, too, raises the question as to the meaning of the statutory term "feasible." Indeed, one of the petitioners' arguments in that case is that OSHA had unlawfully postponed determination of the arsenic standard's feasibility until enforcement proceedings had commenced and had thus promulgated an unlawfully vague standard for those smelters which admittedly could not comply with it. A standard which says only "do what is feasible" is no proper standard at all. For such a standard merely begs the feasibility question. If the Court upholds the standard in that case the effect would be to delegate legislative authority one more step down the line to still another independent government agency, the Occupational Safety and Health Review Commission.

same fate. OSHA, the single-purpose agency created by Congress to regulate the health and safety of the workplace, has, unconstrained by the Court of Appeals, gone too far. And in both cases, the Court of Appeals, in reviewing the standards fashioned by OSHA, has judicially crafted standards or principles as to feasibility which must be rejected.

In *Cotton Dust*, OSHA has promulgated utterly unworkable health standards. Confronted with industry's arguments as to the economic infeasibility of the standards, the Court of Appeals, in an opinion by Chief Judge Bazelon, framed a very expansive standard of "feasibility." According to Judge Bazelon, the requirement of economic feasibility is satisfied *so long as industry's compliance with that single standard of that one single-purpose agency would not result in the industry's economic demise*. No consideration was given by the Court of Appeals, or required by it of OSHA, to the cumulative effects of the textile industry's compliance with the standards of other single-purpose regulatory agencies pressing their respective goals.

Cotton Dust is not an aberrational decision. It was, to the contrary, the harbinger of an even more expansive "approach toward feasibility" created in the *Lead Case* by Chief Judge Bazelon's successor. Notwithstanding the undisputed fact that no technology currently exists that could bring about industry's compliance with the lead standard, the D.C. Circuit, in an opinion by Chief Judge Wright, held that OSHA had fully satisfied the feasibility requirement of Section 6(b)(5). According to Chief Judge Wright, over the strenuous dissent of Judge MacKinnon,[6] technological feasibility was satisfied even

---

[6] Judge MacKinnon in dissent aptly described the feasibility provision in Section 6 (b) (5) as "very inartfully crafted." Dissenting op. of MacKinnon, J. at 20.

though no technology existed nor was technology even "loom[ing] on today's horizon"[7] that would permit industry to meet OSHA's stringent standard. Chief Judge Wright permitted this remarkable result by relying upon a *presumption* — the presumption that when the deadline for compliance arrives ten years hence — a number that OSHA essentially picked out of a hat — technology will in fact exist which will be *economically* feasible for industry to have put into place to meet OSHA's standard. This is judicially sanctioned agency discretion run riot; OSHA has, in short, required industry to do that which may be utterly impossible to achieve technologically or economically, or both, yet the courts have upheld this result in an unduly deferential and flatly erroneous reformulation of well-settled principles of administrative law, such as the substantial evidence and best evidence rules.

The District of Columbia Circuit has gone very far toward permitting OSHA to do whatever it wants to do

---

[7] This is in direct contradiction with the Third Circuit's holdings in American Federation of Labor & Congress of Industrial Organizations, AFL-CIO v. Brennan, *supra*, and American Iron and Steel Inst. v. OSHA, 577 F.2d 825 (3rd Cir. 1978). In American Federation of Labor, the court held that the Secretary of Labor's technology-forcing power is limited to technology that "looms on today's horizon." 530 F.2d at 121-22. Similarly, in American Iron and Steel Institute, the court emphasized that "the Secretary can impose a standard which requires an employer to implement technology 'looming on today's horizon,' and is not limited to issuing a standard solely based upon technology that is fully developed today. *Nevertheless, the statute does not permit the Secretary to place an affirmative duty on each employer to research and develop new technology.*" 577 F.2d at 838 (emphasis added). *See also* Texas Independent Ginners Ass'n v. Marshall, *supra* (requiring that technology which could achieve the OSHA-mandated standard be "existing, nearly developed or available . . . "). Slip op. at 1225 n. 49.

in pursuing its single purpose. Both in *Cotton Dust* and the *Lead Case,* the "feasibility" requirement, which Congress did not specifically define, has now been rendered meaningless.

C. Evisceration Of The "Substantial Evidence" Rule

In fashioning a *judicial* approach to feasibility, the court below in both cases did so within the framework of the "substantial evidence" test by which the feasibility issue was then judicially examined. The Court of Appeals' formulation of that test is, to be sure, erroneous and must be rejected. But its formulation is more than just wrong. The "substantial evidence" test as formulated and applied by Chief Judge Bazelon and his successor to both the cotton dust and lead health standards demonstrates that the real root of what went wrong below is that, as construed by the Court of Appeals, the Act constitutes an impermissible delegation of legislative power.

The Court of Appeals, in its self-conceived role as a "partner of the agency,"[8] sanctioned under the rubric of "substantial evidence" *OSHA legislation fashioned without the benefit of clear congressional standards.* Congress' drafting of the statute in sweeping terms put the Court of Appeals, and indeed OSHA itself, in a box. OSHA compounded the problem by making error after

---

[8] In Cotton Dust, Chief Judge Bazelon referred to the "partner of the agency" concept in the following manner:

> Congress apparently created an "uneasy partnership" between the agency and the reviewing court to check the extravagant exercises of the agency's authority to regulate risk. Our role in this partnership is to ensure that the regulations resulted from a process of reasoned decisionmaking consistent with the agency's mandate from Congress. 617 F.2d at 649-50 (footnotes omitted).

error in the procedures by which its unguided rulemaking was accomplished, as will be explained below. And neither Chief Judge Bazelon nor Chief Judge Wright in the hundreds of pages of analysis below in *Cotton Dust* and the *Lead Case* managed to get the courts or the agency out of the box. To the contrary, they made a bad situation even worse, as we will now show.

While describing the "substantial evidence" requirement as a "stringent" and "rigorous" standard, 617 F.2d at 648-49, the Court of Appeals in fact adopted in *Cotton Dust*, and as amplified in the *Lead Case*, a standard of review which is less rigorous than that traditionally applied under an "arbitrary and capricious" test. The result is an immunization of OSHA action from meaningful judicial review, inconsistent with both the letter and the spirit of the Supreme Court's recent ruling in *Benzene*.[9]

---

[9] In that case, the Court rejected the agency's argument that the rulemaking record contained substantial evidence "to support its conclusion that there is no absolutely safe level for a carcinogen. . . . " The court held, to the contrary, that "the burden was on the agency to show, on the basis of substantial evidence, that it is *at least more likely than not* that [the health standard then in effect for exposure to benzene] presents a significant risk of material health impairment." 100 S. Ct. at 2869 (emphasis added).

This view of substantial evidence was not the plurality's alone in Industrial Union Dept., AFL-CIO v. American Petroleum Inst., *supra*. Justice Marshall, although dissenting, acknowledged that the "substantial evidence test" is "more stringent than the traditional 'arbitrary and capricious' standard" and that even the latter test "contemplates a searching 'inquiry into the facts' in order to determine 'whether the decision was based on consideration of the relevant factors and whether there has been a clear error of judgment.'" 100 S. Ct. at 2895-96 (dissenting op. of Marshall, J.) *quoting* Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 416 (1971).

See also National Lime Ass'n v. EPA, 627 F.2d 416, 430, 451 n. 126 (D.C. Cir. 1980), holding that the "arbitrary and capricious" standard imposes a "rigorous standard" of judicial review involving a "hard look" at an agency's actions.

Effectively rejecting this precedent, the Court of Appeals in *Cotton Dust* relied instead on its own previous decisions, holding that the "substantial evidence" requirement is one that merely "ensure[s] that decision makers articulate the basis for their decision." 617 F.2d at 651 n. 66. Thus, the court below held only that "the agency must pinpoint the factual evidence and the policy considerations upon which it relied. This requires explication of the assumptions underlying predictions or extrapolations, and of the basis for its resolution of conflicts and ambiguities. . . . [T]he court does not reach out to resolve controversies over technical data. Instead, it seeks to ensure public accountability." *Id.* at 651.[10]

To the court below, then, the requirement that OSHA find substantial evidence to justify its rulemaking boils down simply to a necessity for OSHA to explain its reasons for acting in any way it chooses. Similarly, the court's reading of the statutory command that OSHA act only on the basis of the "best available evidence" means only that OSHA make its "policy considerations" based upon whatever evidence it chooses to collect, even if that "information is incomplete." *Id.* This is utterly contradictory to the approach espoused by Mr. Justice Powell in his discussion in ***Benzene*** of the "best available evidence" requirement. "The statutory preference for the 'best available evidence' . . . implies that OSHA must use the best known techniques for the accurate estimation of risks and benefits when such techniques are available." 100 S. Ct. at 2876 (concurring [in part] opinion of Powell, J.).

---

[10] The Fifth Circuit, in contrast to the approach of the court below, required OSHA to demonstrate substantial evidence both as to factual and policy determinations. Texas Independent Ginners Ass'n v. Marshall, *supra*, slip op. at 1214.

The District of Columbia Circuit thus, in effect, rejects the Supreme Court's warning in *Universal Camera Corp.* v. *N.L.R.B.*, 340 U.S. 474 (1951), that, when reviewing agency actions under the substantial evidence test, courts must not foresake "the conventional judicial function." *Id.* at 490. That function, in a word, is to review meaningfully the entire administrative record to ensure that the agency decision is, on the whole record, supported by substantial evidence. In contrast to this well-settled approach, this single-purpose agency is permitted, indeed encouraged, by the Court of Appeals to engage in just the sort of rulemaking by speculation and assumption that this Court warned against in *Benzene*. Under this approach, OSHA can do anything it wants to do.[11]

---

[11] The grant of sweeping power which the Court of Appeals for the District of Columbia Circuit provides OSHA is even more disturbingly apparent in the Lead Case. The rulemaking proceedings in that case were rife with procedural imbroglios. So significant were the procedural issues at stake, that the majority in the court below stated: "As we acknowledge at several points in this opinion, OSHA's procedures and evidence gathering were less than perfect, and a number of important questions on appeal are very close." Maj. op. at 7 n. 6. Although the Court of Appeals found its hand tied by a strained reading of this Court's decision in Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519 (1978), still the majority was critical of OSHA's actions: OSHA was "careless or inefficient in its procedures throughout this rulemaking," maj. op. at 15; "the compliance rules in the final standard appear ill-drafted and ill-explained, especially in light of their departure from . . . the proposed lead rules," maj. op. at 50; the agency's explanation "is a *tour de force* of obfuscation," maj. op. at 59. Of these procedural irregularities, perhaps most glaring was OSHA's decision to issue a final standard with a permissible exposure limit for airborne lead of 50 micrograms per cubic meter of air (50 ug/m^3), after having issued a proposed standard at 100 ug/m^3 as a replacement for an existing OSHA standard settng the permissible exposure limit at 200 ug/m^3. Thus, "[v]ery little evidence was submitted by industry petitions *or the agency* on any level but the 100 ug/m^3, or higher.

The extraordinary power which the Court of Appeals vests in OSHA becomes even more glaring when one examines the lead standard's medical removal protection earnings requirement at issue in the *Lead Case*. This provision requires employers to remove workers under specified circumstances from the exposed workplace and to maintain those workers at their existing wage levels. Yet, under the statute, OSHA is not vested with authority to adopt the medical removal/earnings protection program required by the new lead regulation. Furthermore, as the dissent in the *Lead Case* per-

---

OSHA *concedes that no evidence whatsoever was introduced on the economic feasibility of complying with the 50 ug/m³ level."* Dissenting op. of MacKinnon, J. at 9 (emphasis in original). The D.C. Circuit, however, found the standard both technologically and economically feasible. Ignoring the spirit, if not the letter, of this Court's holding in Benzene that OSHA should regulate on the basis of fact and not assumption or theory, the majority of the Court of Appeals in the Lead Case found it appropriate for OSHA to "make highly speculative projections about future technology. . . . " Maj. op. at 145. Thus, the court upheld the technological feasibility of the lead standard on the "*presumption*" that there is a "reasonable possibility" that at some point in the future a "typical firm" will be technologically able to comply with the standard "in most of its operations." Maj. op. at 154, 159. This it did, furthermore, by finding that the substantial evidence test was satisfied by testimony that "give[s] *some credence* to OSHA's *prediction* that the PEL *might* be met." Maj. op. at 177 (emphasis added).

The majority of the Court of Appeals in the Lead Case then proceeded to excuse OSHA from the duty to estimate costs, *because* the technology involved was so speculative. Maj. op. at 170, 179. OSHA made no attempt to present or elicit evidence on the costs of the final lead standard. Nor did it attempt to determine the costs of the medical removal protection earnings requirements compelled by the standard. The court below found it unnecessary to require such evidence of OSHA on its theory that the best available evidence rule merely requires OSHA to refer to that evidence, if any, that happens to be "available" in the record. *See, e.g.*, maj. op. at 147-48, 170-71 n. 133.

suasively explains, the majority's reasoning on this issue flies in the face of clear statutory language, the legislative history of the Act and the Supreme Court's recent interpretation of such language and history in *Whirlpool Corp.* v. *Marshall*, 445 U.S. 1 (1980). Dissenting opinion of MacKinnon, J. at 13-20. This provision is, as the majority opinion in the *Lead Case* noted, "relatively without precedent." Maj. opinion at 12, 22 n. 15 and 66 n. 63. It is totally different from the medical removal protection provisions contained in the asbestos and cotton dust standards. *See Industrial Union Department, AFL-CIO* v. *Hodgson*, 162 U.S. App. D.C. 331, 499 F.2d 467 (1974); *American Federation of Labor & Congress of Industrial Organizations* v. *Marshall*, *supra*. Both those provisions were limited to employees who were unable to wear respirators and for whom "a different position" is available which they are "able to perform." *See, e.g.*, 29 C.F.R. §1910.1001(d)(2)(iv)(c). Thus, while the requirement in both the lead standard and the cotton dust standard is applicable even when the worker's health is not endangered, and even when the perceived hazard to the worker results from off-the-job activities, in the lead standard the requirement is operative even when the employer has no position available to which the removed worker can be transferred. Thus, under the lead standard, an employee may be sent home, healthy and with full pay for not working.

D. The Doctrine of Nondelegation

The result below is extraordinary. The result in the *Lead Case* is even worse. The effect of the two decisions, taken together, is that OSHA is not constrained by any standard or benchmark with respect to the feasibility of its health standards. OSHA has been permitted to engage not simply in rulemaking; rather, as the

Act has been interpreted by the Court of Appeals, OSHA has been judicially sanctioned to engage in the core legislative function of policymaking.

This is no academic concern. By means of the lead standard, OSHA, as sanctioned by the Court of Appeals, is in effect requiring ASARCO and other smelters to rebuild their plants from the ground up in order to achieve a single health-related purpose. Similarly, far-reaching results are now mandated for the textile industry in the instant case. By doing so in both cases, OSHA has made a broad policy choice that, in our view, severely impacts the imperative economic interests and stability of entire industries.

Whatever the efficacy of basic doctrines of constitutional law as to separation of powers, one point should be clear: OSHA has not simply formulated or legislated a set of health standards; it is restructuring the very shape and foundation of vital U.S. industries. And OSHA's reshaping of those industries is being carried out from the admittedly important but nonetheless limited vantage point of worker health — as affected by *one* and only one perceived threat to health.[12]

---

[12] The perceived threat to health, moreover, is not under any rational view imminent. To the contrary, neither cotton dust nor lead is a carcinogen. And, as regards lead, the perceived health effects are subclinical in nature, posing no substantive threat to worker health. As stated by the court in the Lead Case, "OSHA is acting to prevent, not overt early symptoms of disease, but subclinical effects." Maj. Op. at 115. *Cf.* Texas Independent Ginners Ass'n v. Marshall, *supra* (holding, in striking down OSHA's health standard for the cotton gin industry, that OSHA failed to adduce substantial evidence to support the conclusion that exposure to cotton dust by cotton gin employees constituted a significant health hazard). Slip op. at 1217-21.

The issue, then, is whether the Court of Appeals has interpreted Section 6(b)(5) so as to cross the line, which no one would claim to be a bright one, between improper delegation of legislative power and an appropriate delegation in the contemporary regulatory environment. While the constitutional line may not be a bright one, we think that the answer here is clear. As the Act has now been construed by the Court of Appeals, the statute fails to provide or give any standard or meaning whatever to the vital concept of "feasibility" — the most significant limitation upon OSHA's broad authority has been effectively written out of the statute.

We think, and a member of this Court has indeed recently suggested,[13] that the nondelegation doctrine is not some moribund relic from the old days of substantive due process. To the contrary, decisions such as *Panama Refining Co.* v. *Ryan*, 293 U.S. 388 (1935), provide a shield for the judiciary against the burdens or, perhaps for some, the temptations of judicial legislating and policymaking. For when Congress sets forth its policies and articulates clearly intelligible standards to guide the executive branch in implementing Congress' will, the province of the judiciary remains properly that of authoritatively determining what the law is — but not creating the policies underlying the law. *Panama Refining* and its progeny are thus not instruments of judicial activism, to use a perhaps shop-worn phrase, but necessary doctrines by which the appropriate functioning of all three branches of government can be sustained in changing times. The Court of Appeals has failed to ensure the appropriate functioning of the coordinate branches of the government.

---

[13] *See* Industrial Union Dept., AFL-CIO v. American Petrolum Inst., *supra* at 2886 (concurring op. of Rehnquist, J.).

Let there be no mistake: concern as to improper delegations of legislative power cannot be dismissed as so much reactionary cant. Nor can this Court afford to ignore first principles of our form of government. As one member of this Court well put it:

> Formulation of policy is a legislature's primary responsibility, entrusted to it by the electorate, and to the extent Congress delegates authority under indefinite standards, this policy-making function is passed on to other agencies, often not answerable or responsive in the same degree to the people. *United States* v. *Robel*, 389 U.S. 258, 276 (1967) (concurring opinion of Brennan, J.).

See also, e.g., Arizona v. *California*, 373 U.S. 546 (1963) (Harlan, J., dissenting in part); O. Freedman, *Crisis and Legitimacy: The Administrative Process and American Government* 93 (1973) ("Congress, in the act of delegating legislative power, may not abdicate its constitutional responsibility for making the nation's basic decisions of policy.").

The sweeping delegation of legislative power, the effect of the Court of Appeals' approach, to a single-purpose executive agency which has formed a view as to "the best means of carrying out [its] mission," *United Steelworkers of America, AFL-CIO-CLC* v. *Marshall, supra*, maj. opinion at 19, circumvents the legislative process of compromise, accommodation, and eventual legislation. As Professor Tribe has aptly stated:

> [B]road delegations are politically objectionable because, by enabling Congress to pass the buck on hard choices, and to leave such choices to administrative or executive processes less open to inputs from affected groups, such delegations may short-circuit the pluralist processes of interest accommodation usually structuring legislative decision-making. L. Tribe, *American Constitutional Law* 288 (1978).

Similarly, in the words of Judge Friendly, "[w]e still live under a Constitution which provides that all 'legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of Senate and House of Representatives;' even if a statute telling an agency 'Here is the problem: deal with it' be deemed to comply with the letter of that command, it hardly does with the spirit." H. Friendly, *The Federal Administrative Agencies* 21-22 (1962) (footnote omitted).

In our view, under the Court of Appeals' decisions in *Cotton Dust* and the *Lead Case* Congress did nothing more in Section 6(b)(5) than identify the problem and direct the executive branch to deal with it. This Court should not permit that extraordinary result to stand, especially in the present era — even in the so-called age of "deregulation" — when single-purpose regulatory agencies created by the Congress in the past twenty years nonetheless continue to abound and to regulate. This is a different time than before, in that Congress has acted in the past two decades in novel ways. The Court can ill afford to ignore this fact, particularly now that the substantive actions of one such single-purpose agency are coming before it for the first time since OSHA's creation.[14]

---

[14] Prior to the decision in Industrial Union Dept., AFL-CIO v. American Petroleum Inst., *supra*, all of this Court's cases dealing with the Act have dealt with procedural, not substantive, issues. Marshall v. Barlow's Inc., 436 U.S. 307 (1978) (dealing with the requirement of search warrants for OSHA inspections); Atlas Roofing Co. v. OSHA, 430 U.S. 442 (1977) (treating the issue of entitlement to jury trial with respect to civil penalties); Whirlpool Corp. v. Marshall, *supra* (dealing with the right of employees to avoid hazardous workplace conditions).

For, as we have now made clear, OSHA has adopted health standards that may bring the textile industry up to the very brink of economic demise, and it has required the lead industry to rebuild all of its plants from the ground up — an awesome and economically unbearable price to exact for compliance with what are, in our view, flatly unrealistic, unsupported standards that are of dubious benefit to persons whose health OSHA seeks to protect.

The Court of Appeals has abdicated its responsibility. By sweepingly interpreting the words "feasible" and "feasibility" so as to render them meaningless, the Court of Appeals has, in effect, conferred core legislative functions upon OSHA, so as to compromise the respective provinces of the coordinate branches of government.

E. CONCLUSION

Above all, this case should not be viewed by the Court in isolation. This is not simply a technical case involving a particular health standard. OSHA and the Court of Appeals went far in *Cotton Dust*, just as OSHA, until reversed by the Fifth Circuit Court of Appeals, went far in *Benzene*.[15] OSHA and the Court of Appeals for the District of Columbia Circuit have gone even farther in the *Lead Case*. The Court should reject OSHA's messianic approach in formulating sweeping health standards, just as it did in *Benzene*, so as to avoid the vexing constitutional issue that would otherwise be raised — namely, that Section 6(b)(5) of the Act, as construed by the Court of Appeals, constitutes an impermissibly overbroad delegation of legislative power.

Respectfully submitted,

WILLIAM J. KILBERG
Counsel of Record

STEPHEN E. TALLENT
KENNETH W. STARR
1776 G Street, N.W.
Washington, D.C. 20006
(202) 789-8500

Of Counsel:

H. FREDERICK TEPKER
WILLIAM R. HYDE, JR.
GIBSON, DUNN & CRUTCHER

---

[15] The Fifth Circuit recently overturned OSHA's health standard for the cotton gin industry on the grounds (a) that OSHA had not found by substantial evidence that a significant risk of a material health impairment existed, and (b) that OSHA had not demonstrated by substantial evidence that the standard was reasonably necessary or appropriate to provide safe or healthful employment or places of employment. Texas Independent Ginners Ass'n v. Marshall, *supra*, slip op. at 1217, 1220-21, 1223-26.

Nos. 70-1429, and 79-1583

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., *et al.*,
Petitioners

v.

RAY MARSHALL, SECRETARY OF LABOR,
Respondent.

NATIONAL COTTON COUNCIL OF AMERICA, *et al.*,
Petitioners

v.

RAY MARSHALL, SECRETARY OF LABOR, *et al.*,
Respondent.

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

BRIEF FOR BROWN LUNG ASSOCIATION, INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, UAW, AMERICAN PUBLIC HEALTH ASSOCIATION, ET AL., AS AMICI CURIAE

J. DAVITT MCATEER
CENTER FOR LAW AND SOCIAL POLICY
1751 N Street, N.W.
Washington, D.C. 20036
(202) 872-0670

JOHN A. FILLION
General Counsel
CLAUDE D. MONTGOMERY
Assistant General Counsel
INTERNATIONAL UNION, UAW
8000 E. Jefferson
Detroit, Michigan
(313) 926-5216

Attorneys for Amici Curiae

Of Counsel:

DEBORAH WEIMER
BLAIR LEVIN
Brown Lung Legal Center
528 Knox Abbott Dr.
Cayce, S.C. 29033

DATED: December 20, 1980

WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

AMICI CURIAE

BROWN LUNG ASSOCIATION
INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, UAW
AMERICAN PUBLIC HEALTH ASSOCIATION
AMERICAN FRIENDS SERVICE COMMITTEE
CATHOLIC COMMITTEE OF APPALACHIA
COALITION OF LABOR UNION WOMEN
DOMESTIC EQUALITY PROGRAM—INTERFAITH CENTER FOR CORPORATE RESPONSIBILITY
EXECUTIVE COMMITTEE OF NATIONAL ASSOCIATION OF WOMEN RELIGIOUS
WOMEN'S DIVISION, BOARD OF GLOBAL MINISTRIES, THE UNITED METHODIST CHURCH
METHODIST FEDERATION FOR SOCIAL ACTION
NATIONAL ASSEMBLY OF WOMEN RELIGIOUS
WOMEN FOR RACIAL AND ECONOMIC EQUALITY
NATIONAL ORGANIZATION FOR WOMEN—LABOR COMMITTEE
NATIONAL FEDERATION OF PRIESTS' COUNCIL

QUESTIONS PRESENTED

(1) Does the Occupational Safety and Health Act, 29 U.S.C. § 651 et seq. require the Secretary of Labor to engage in a cost benefit analysis prior to promulgation of a work place toxic substance exposure standard?

(2) Does the Occupational Safety and Health Act, 29 U.S.C. § 651 et seq. permit the Secretary of Labor to control exposure to hazardous substances prior to the onset of disease?

TABLE OF CONTENTS

	Page
QUESTIONS PRESENTED	i
TABLE OF AUTHORITIES	v
INTEREST OF AMICI	1
CONSENT OF THE PARTIES	3
STATEMENT OF THE CASE	3
ARGUMENT	6
I. INDUSTRY'S FORMULATION OF A COST-BENEFIT TEST WHICH QUALIFIES THE SIGNIFICANCE OF RISK IN LIGHT OF THE STANDARD'S COMPLIANCE COSTS IS NOT SUPPORTED BY THE STATUTE	6
A. The Language Of The Act Will Not Support A Cost-Benefit Analysis Requirement	7
B. The Legislative History Of The Act Is Consistent With The Plain Meaning Of The Statutory Language Showing No Cost-Benefit Requirement	8
C. The Benzene Decision By This Court Does Not Require OSHA Balance Health Risk Reduction Against Industry Compliance Costs	9
D. If Congress Had Intended A Quantitative Cost-Benefit Analysis Under § 6(b)(5) Of OSH Act It Would Have So Stated	11
II. APPLICATION OF COST-BENEFIT ANALYSIS TO OSHA STANDARDS IS INAPPROPRIATE	13
A. Technical Deficiencies Militate Against The Use Of Cost-Benefit Analysis To Promulgate Occupational Health Standards	14
B. Monetizing Human Life Is A Necessary Part Of Any Overt Comparison Of Health Benefit And Compliance Costs	17

PREVIOUS PAGE WAS BLANK

TABLE OF CONTENTS—Continued

Page

III. THE LOWER GRADES OF BROWN LUNG DISEASE ARE MATERIAL IMPAIRMENTS OF HEALTH AND FUNCTIONAL CAPACITY AND WERE THEREFORE PROPERLY A BASIS FOR REGULATION 21

IV. CONCLUSION 26

TABLE OF AUTHORITIES

Cases Page

AFL-CIO v. *Marshall*, 617 F.2d 636 (D.C. Cir. 1979), appeal pending with *American Petroleum Institute* v. *OSHA*, 581 F.2d 493 (5th Cir. 1978), aff'd on other grounds, 444 U.S. 818 (1980) 3, 8, 21, 24

American Petroleum Institute v. *Marshall*, 448 U.S. ——, 48 L.W. 5022 (1980) 9, 10, 11

Caminetti v. *United States*, 242 U.S. 470 (1917) 7

E.I. duPont de Nemours & Co. v. *Train*, 430 U.S.C. 112 (1977) 12

EPA v. *National Crushed Stone Assn.*, —— U.S. ——, 49 L.W. 4008 (1980) 12

Ethyl Corp. v. *Environmental Protection Agency*, 541 F.2d 1 (D.C. Cir. 1976), *cert. denied*, 426 U.S. 941 (1976) 10

Helvering v. *Hammell*, 311 U.S. 504 (1941) 7

Nat. Congress of Hispanic Am. Citizens v. *Marshall*, 626 F.2d 882 (D.C. Cir. 1979) 10

RMI Co. v. *Sec. of Labor*, 594 F.2d 566 (6th Cir. 1979) 8

Texas Independent Ginners Assn. v. *Marshall*, —— F.2d ——, 8 BNA OSHC 2205 (1980) 23

Turner Co. v. *Sec. of Labor*, 561 F.2d 82 (7th Cir. 1977) 8

United States v. *Dangdee*, 616 F.2d 1118 (9th Cir. 1980) 8

United States v. *Jones*, 607 F.2d 269 (9th Cir. 1979) 8

United States v. *Kelly*, 519 F.2d 251 (8th Cir. 1975) 7

United States v. *Standard Brewery*, 251 U.S. 210 (1920) 7

United Steelworkers of America v. *Marshall*, —— F.2d ——, 8 BNA OSHC 1810, (D.C. Cir. 1980) .. 23

Vermont Yankee Nuclear Power v. *NRDC*, 435 U.S. 519 (1978) 14, 20

Weyerhaeuser Corp. v. *Costle*, 590 F.2d 1011 (D.C. Cir. 1978) 12

TABLE OF AUTHORITIES—Continued

Page

Whirlpool Corp. v. *Marshall*, —— U.S. ——, 8 BNA OSHC 1001 (1980) 25

Statutes

Energy Policy and Conservation Act of 1975, 42 U.S.C. § 6201 *et seq.* 12
Section 6295, 42 U.S.C. § 6295(d) 12
Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. § 1251 *et seq.* 12
Flood Control Act of 1936, 33 U.S.C. § 701(a) 11
Occupational Safety and Health Act of 1970, 29 U.S.C. § 651 *et seq.*
Section 2(b), 29 U.S.C. § 651(b) 25
Section 3(8), 29 U.S.C. § 652(8) 6, 8, 10
Section 6(b)(5), 29 U.S.C. § 655(b)(5) 10, 22, 23
Outer Continental Shelf Lands Act Amendment of 1978, 43 U.S.C. § 1347(b) 12
The Rivers and Harbors Act of 1902, Pub. L. No. 57-154
Section 3, 32 Stat. 372 (1902) 11
The Rivers and Harbors Act of 1920, Pub. L. No. 66-263
Section 2, 41 Stat. 1010 (1920) 11
Walsh-Healy Act, 41 U.S.C. § 5 *et seq.* 5

Legislative History

118 Cong. Rec. 33696 (1972) 12
Occupational Safety and Health Act of 1970 .....
Subcommittee on Labor of the Senate Committee on Labor and Public Welfare, 91st Cong., 2d Sess., Legislative History of the Occupational Safety and Health Act of 1970 (1970) 9, 22, 23
S. Rep. No. 1282, 91st Cong., 2d Sess. (1970) 22
Subcommittee of the Senate Committee on Appropriations, 95th Cong., 1st Sess., Special Hearing on Brown Lung (1978) 16

TABLE OF AUTHORITIES—Continued

Rules

	Page
29 C.F.R. § 1910.1043	6
29 C.F.R. § 1910.1043(b)	6
39 Fed. Reg. 44769	5
41 Fed. Reg. 46742	18, 20, 21
41 Fed. Reg. 56498	5
43 Fed. Reg. 27350	6
43 Fed. Reg. 27351	4, 5, 6
43 Fed. Reg. 27351-54	25
43 Fed. Reg. 27354	23, 25
43 Fed. Reg. 27362	25
43 Fed. Reg. 27379	20

Miscellaneous

Adams, J.G.U., . . . And How Much For your Grandmother? 6 Environment and Planning A.619 (1974)	19
Alexander, M. and S., Disaster as a Necessary Part of Cost-Benefit Analysis, 197 Sci. 1160 (1977)	15
Anderson L. & Settle, R.R., Benefit-Costs Analysis: A Practical Guide (1977)	14
Baram, W., Cost-Benefit Analysis: An Inadequate Basis for Health, Safety, and Environmental Decisionmaking, 8 Ecology L. Q. 493 (1980)	11, 13, 14, 17, 18
Chalfant, Hartmann & Blakeboro, Recombinant DNA: A Case Study in Regulation of Scientific Research, 8 Ecology L. Q. 55 (1979)	14, 18
Hughes, J., Brown Lung Disability: Costs Compensation and Controversy And Explanatory Policy, U.S. Dept. of Labor ASPER (June 1979)	16
Lovins, Cost-Risk Benefit Agreement in Energy Policy, 45 Geo. Wash. L. Rev. 911 (1977)	15
Lawrence, W., of Acceptable Risk (1976)	18
Mendeloff, J., Regulatory Safety (MIT Press, Cambridge, 1979)	15

TABLE OF AUTHORITIES—Continued

Page

National Academy of Sciences, Decisionmaking for Regulating Chemicals in the Environment 17 (1975) 13
NIOSH, Criteria for a Recommended Standard Occupational Exposure to Cotton Dust, 26 (1974) 3, 24
Note, The Concorde Calculus, 45 Geo. Wash. L. Rev. 1037 (1977) 20
Prunella, W., A Quantative Assessment of Cost-Benefit Analysis and Its Application in the Area of Product Safety 3-4 (Report submitted to Consumer Product Safety Commission—Economic Program Analysis Division, Feb. 1978).. 18
Rogers, W., "Benefits, Costs, and Risks: Oversight of Health and Environmental Decisionmaking," 4 Harv. Env. L. Rev. 191 (1980) 11, 13
Ruttenberg, R., Regulatory Controversy: The Cost of Health and Safety 4-5 unpublished paper, Feb. 1980 18
Textile Reporter (July 10, 1969) 5
Tribe, Technology Assessment and the Fourth Discontinuity: The Limits of Instrumental Rationality, 46 S.Cal. L. Rev. 617 (1973) 15
Washington Post, Nov. 28, 1980 5
Zimmerman, B., Risk-Benefit: The Cop-out of Government Policy, 14 Trial 42-45 (1978) 20

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

Nos. 70-1429, and 79-1583

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., *et al.*,

Petitioners

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent.

NATIONAL COTTON COUNCIL OF AMERICA, *et al.*,

Petitioners

v.

RAY MARSHALL, SECRETARY OF LABOR, *et al.*,

Respondent.

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

---

BRIEF FOR BROWN LUNG ASSOCIATION, INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, UAW, AMERICAN PUBLIC HEALTH ASSOCIATION, ET AL., AS AMICI CURIAE

INTEREST OF AMICI

BROWN LUNG ASSOCIATION is an organization of active and disabled textile workers in North Carolina, South Carolina, Virginia, and Georgia. The Association was formed five years ago with the purpose of assisting workers disabled from breathing cotton dust, educating workers still at risk in the mills about the hazards of cotton dust, and advocating for cleaner mills.

INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, UAW, is the largest union representing workers in the automobile industry and has a long standing commitment to health and safety for workers in all industries.

AMERICAN PUBLIC HEALTH ASSOCIATION is a non-profit corporation which maintains a membership of 30,000 public health professionals throughout local, state, and federal levels.

CATHOLIC COMMITTEE OF APPALACHIA is a Catholic commission serving 13 states including both North Carolina and South Carolina committed to assisting workers in health and safety rights.

NATIONAL FEDERATION OF PRIESTS' COUNCILS is an organization representing 82 councils of priests, 9 associations and 9 religious orders, and has long been interested in the rights of workers.

BOARD OF GLOBAL MINISTRIES—THE UNITED METHODIST CHURCH is an organization of ministers and lay persons committed to working for improved health and safety.

AMERICAN FRIENDS SERVICE COMMITTEE is an organization dedicated to humanitarian relief and to educate workers about their rights to a healthy and safe work environment.

COALITION OF LABOR UNION WOMEN is an organization of women who are involved in trade union and occupational issues.

DOMESTIC EQUALITY PROGRAM—INTERFAITH CENTER FOR CORPORATE RESPONSIBILITY is a coalition of religious institutional investors who are interested in health and safety.

NATIONAL ASSEMBLY OF WOMEN RELIGIOUS—EXECUTIVE COMMITTEE is an organization of nuns

and lay persons concerned for the health of workers and for sound environmental standards.

METHODIST FEDERATION FOR SOCIAL ACTION is an independent fellowship concerned about workers' health and safety.

NATIONAL ORGANIZATION FOR WOMEN—LABOR COMMITTEE is the official committee dedicated to issues concerning women in the work place.

CONSENT OF THE PARTIES

Counsel of record in both cases consented to the filing of this brief. Consent letters have been filed with this brief. Consent was sought from individual corporate counsel and was granted by reference to Counsel of Record. In three instances counsel was unavailable.

STATEMENT OF THE CASE

Petitioners including representatives of the cotton textile and nontextile industries have sought judicial review of the Court of Appeals for the District of Columbia's decision [1] upholding the Standard for Occupational Exposure to Cotton Dust (Cotton Dust Standard or Standard), promulgated by the Occupational Safety and Health Administration (OSHA) to protect over 800,000 of the nation's textile workers, many of whom suffer from a crippling disease known as byssinosis or "brown lung". This Court granted Petitioners' motion for a writ of certiorari on October 6, 1980.

HISTORY OF THE COTTON DUST STANDARD

Cotton dust results from the manufacture of cotton cloth. It can cause chronic disabling respiratory ailments and even lead to the death of overexposed workers through stress-related heart failure. NIOSH, *Criteria for a Recommended Standard Occupational Exposure to Cotton Dust*, 26 (1974). It was only after pressure by the Textile Workers Union that OSHA undertook an ex-

---

[1] *AFL-CIO* v. *Marshall*, 617 F.2d 638 (D.C. Cir. 1980).

haustive analysis of the health problems related to cotton dust. 43 Fed. Reg. 27351. The results impelled OSHA to finally regulate permissible levels of exposure to the substance. *Id.*

The severe health problems related to cotton dust in cloth manufacture have been fully documented since the middle of this century. In 1942, byssinosis was recognized as a compensable ocupational disease under British statutes. 43 Fed. Reg. 27351. In 1950, Dr. Schilling published his landmark work on the symptomology of byssinosis, which remains a standard reference. Ex. 38A, p. 5.

Acknowledgement of the hazards of cotton dust by American industry came much more slowly. By 1961, two British scientists had documented the existence of byssinosis in American textile mills, and had called for a comprehensive survey of the problem. Ex. 77, pp. 4-5. When the U.S. Public Health Service commissioned Dr. Arend Bouhuys in 1964 to perform such a study, the response of the Georgia textile industry was an attempt to abort the study by applying pressure on the president of the university at which Dr. Bouhuys was teaching, and by denying Dr. Bouhuys access to the mills. Dr. Bouhuys was forced to conduct his study in the mill at the U.S. penitentiary in Atlanta, from which the industry could not exclude him. Ex. 77, p. 5; Ex. 78, App. 4, p. 2.

In 1967, Dr. Bouhuys reported that:

> "all cotton workers seen [in this study] who had been exposed for many years to dust in cardrooms, had byssinosis, and more than half of them were respiratory cripples." Ex. 77, p. 6.

Sixteen years ago, the American Conference of Governmental Independent Hygienists (ACGIH) decided cotton dust should be controlled and placed cotton dust on its priority list. In 1966, the ACGIH adopted a TLV [2]

---

[2] TLV stands for Threshold Limit Value.

of 1,000 ug/m³ of total cotton dust. Two years later the Secretary of Labor, acting pursuant to the Walsh-Healy Act, 41 U.S.C. § 5 et seq., promulgated the ACGIH standard as an occupational health requirement for public contractors. 43 Fed. Reg. 27351. Yet, industry refused to acknowledge the existence of byssinosis and its hazards to American workers.[3] *See* Ex. 77. pp. 6-7.

On September 26, 1974, the National Institute of Occupational Safety and Health (NIOSH) recommended that the Secretary adopt a cotton dust standard controlling workers, exposure to a level of 200 ug/m³ in all segments of the cotton industry. OSHA published an Advanced Notice of Proposed Rulemaking on Cotton Dust requesting interested parties to submit comments on NIOSH's recommendations. 39 Fed. Reg. 44769. On December 28, 1976, two years after receiving comments from interested parties, OSHA proposed a 200 ug/m³ cotton dust standard. 41 Fed. Reg. 56498. The revised version called for a Permissible Exposure Level (PEL) of 200 ug/m³ line-free-respirable dust in yarn manufacturing, 700 ug/m³ in slashing and weaving and 500 on all other textile industries. OSHA held hearings in

---

[3] As reecntly as 1969, textile industry trade publication, *Textile Reporter*, authored the following remarks:

> "we are particularly intrigued by the term 'byssinosis', a thing thought up by venal doctors who attended last year's [International Labor Organization] meeting in Africa, where inferior races are bound to be affected by new diseases more superior people defeated years ago." Textile Reporter, July 10, 1969.

The executive vice president of the Georgia Textile Manufacturer's Association once wrote to the President of Emory University in seeking to block the Bouhuy's study: "If this disease were prevalent among cotton textile employees, it would seem to me that at some time during my thirty-seven years in this industry, that fact would come to my attention during the hundreds of meetings and conferences of textile manufacturing employers which I have attended." Ex. 78, App. 4, p. 2. *See also*, Washington Post, at 1, November 28, 1980.

three cities for a total period of 14 days and received comments from 263 parties, 43 Fed. Reg. 27351. OSHA adopted a modified version of the proposal as the final rule. 43 Fed. Reg. 27350, 29 CFR § 1910.1043(b).[4]

ARGUMENT

I. INDUSTRY'S FORMULATION OF A COST-BENEFIT TEST WHICH QUALIFIES THE SIGNIFICANCE OF RISK IN LIGHT OF THE STANDARD'S COMPLIANCE COSTS IS NOT SUPPORTED BY THE STATUTE

Sixteen years after the ACGIH decided cotton dust exposure should be controlled, the American Textile Manufacturers Institute, Inc. (ATMI) urged this Court to reject the government's first effort to improve upon ACGIH's initial recommendation. As grounds, industry asserts that OSHA has totally failed to show that the benefits of improved regulations are justified in light of the costs to industry. This is, in essence, an attack upon OSHA's failure to perform an explicit cost-benefit analysis before promulgation of the cotton dust standard, 29 U.S.C. § 1910.1043.

ATMI admits that § 3(8) of the Act:

> . . . does not mean that OSHA must engage in a rigidly formed cost benefit calculation that places a dollar value on employee lives or health. ATMI Brief at 39

Instead, they argue that risks can only be "significant" in light of costs. ATMI Brief at 40-47, 48-51.

However, in urging reversal of the cotton dust standard for failure to place such an analysis in the record, the result is the same. If OSHA is required to directly

---

[4] The final regulation sets permissible exposure limits of 200 ug/m^3 respirable cotton dust for yarning operations; 750 ug/m^3 respirable cotton dust for slashing and weaving operations; and 500 ug/m^3 for all other textile industries.

balance its assessment of the risks of exposure and any improvement in those risks with the industry compliance costs, then it must do so formally in the record. All methods of formula balancing require either explicit or implicit reduction of the two sides of the equation to comparable or unitary terms, *i.e.*, dollars.[5] This approach has only one name, cost-benefit analysis.

In making their argument, the industry petitioners fail to recognize that neither the statute, the legislative history nor the plurality opinion in American Petroleum Institute v. Marshall, 448 U.S. ——, 48 L.W. 5022 (1980), require or suggest a cost-benefit test is appropriate for occupational health standards.

A. The Language of the Act Will Not Support a Cost-Benefit Analysis Requirement

"The meaning of a statute must be ascertained from the language used by Congress. If the meaning is plain, the law must be enforced as written."[6] Section 6(b)(5), 29 U.S.C. § 655(b)(5) governs standards for hazardous substances. It states simply that:

> [T]he Secretary . . . shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or

---

[5] In fact, ATMI openly suggests one life per year "might" be worth a one time cost of $100,000, but not $1 billion. ATMI brief at 38n. 75. If the statute does not require a "formal" analysis then this suggested benefit valuation cannot be a required basis of an OSHA decision.

[6] *See, United States* v. *Kelly*, 519 F.2d 251, 256 (8th Cir. 1975), citing *Helvering* v. *Hammell*, 311 U.S. 504, (1941); *United States* v. *Standard Brewery*, 251 U.S. 210 (1920). *See also, Caminetti* v. *United States*, 242 U.S. 470 (1917).

> functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. . . .

Those words neither refer to, nor imply that OSHA must engage in any form of balancing of costs against benefits. Likewise, neither the definition of a standard, § 3(8), 29 U.S.C. § 652(8), nor any other section of the Act expressly requires that a cost-benefit analysis be done in promulgating regulations.[7]

Of course, "[t]he statutory language usually is the best evidence of congressional intent because 'we must assume that Congress meant what it said.' *United States* v. *Jones*, 607 F.2d 269, 273 (9th Cir. 1979)." *Accord*, *United States* v. *Dangdee*, 616 F.2d 1118, 1119 (9th Cir. 1980). There is no reason, in this case, to infer from the language that which cannot be literally read.

B. The Legislative History of the Act is Consistent with the Plain Meaning of the Statutory Language, Showing No Cost-Benefit Requirement

The legislative history supports the statutory language by not requiring a cost-benefit analysis.

As Senator Yarborough, then Chairman of the full committee that reported the bill, stated:

---

[7] The Courts of Appeal are split on this issue of whether the "reasonably necessary or appropriate" language of § 3(8), 29 U.S.C. § 652(8) implies the need for a cost benefit test. *Compare*, *AFL-CIO* v. *Marshall*, 617 F.2d 636 (D.C. Cir. 1979), *appeal pending*, with *American Petroleum Institute* v. *OSHA*, 581 F.2d 493 (5th Cir. 1978), *aff'd on other grounds*, 448 U.S. —— (1980).

However, there are also two cases which hold the Secretary must engage in some form of cost balancing when *enforcing* a *non-toxic substance* standard. *RMI Company* v. *Sec. of Labor*, 594 F.2d 566 (6th Cir. 1979); *Turner Co.* v. *Sec. of Labor*, 561 F.2d 82 (7th Cir. 1977).

> We are talking about people's lives, not the indifference of some cost accountants. We are talking about assuring the men and women who work in our plants and factories that they will go home with their bodies intact. We are talking about assuring our American workers who work with deadly chemicals that when they have accumulated a few years' seniority they will not have accumulated lung congestion and poison in their bodies, or something that will strike them down before they reach retirement age. Subcommittee on Labor of the Senate Committee on Labor and Public Welfare, 91st Cong. 2d Sess., *Legislative History, Occupational Safety and Health Act of 1970*, 510 (1970) (Leg. Hist.)]

Congress was aware of the economic burden the Act would place on industry, but decided the protection of workers' health necessitated the expense. No legislator expressed the belief that the protection of workers' health should be compromised on the basis of cost-benefit analysis. In fact, the legislators expressed hostility to the use of cost as a general justification for unsafe or unhealthy working conditions. As Senator Eagleton stated, the costs of assuring such protection must be borne as "necessary costs of doing business". He added "[W]e can no longer permit profits to be dependent upon an unsafe or unhealthy worksite." [8]

C. The Benzene Decision by This Court Does Not Require OSHA Balance Health Risk Reduction Against Industry Compliance Costs

Last term, this Court affirmed the Fifth Circuit's vacating and remanding of an occuptional health standard for exposure to benzene. *American Petroleum Institute v. Marshall*, 48 L.W. 5022 (1980). This Court held that a universal policy of setting standards for exposure to carcinogens at the lowest level feasible was

---

[8] Leg. Hist. at 1150-51 (remarks of Senator Eagleton).

inappropriate. The Stevens' plurality found that § 3(8), 29 U.S.C. § 652(8) placed substantive limitations on § 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5), such that the Secretary must find:

> as a threshold matter, that this toxic substance in question poses a significant health risk in the workplace and that a new, lower standard is therefore 'reasonably necessary or appropriate to provide safe or healthful employment and places of employment.' [48 L. W. at 5024].

The essence of the plurality decision was that the Secretary made no assessment of the health-risks at the then current maximum levels of exposure, and therefore could not justify a finding that an improved standard was necessary. 48 L.W. at 5028.

Clearly, "significant risk" is an *absolute* concept insofar as costs are concerned. It is the significance of a risk which is necessarily a variable finding in light of health policies which allow for qualitative weighing of both the severity of risk *and* the probability of risk. *API* v. *Marshall*, 48 L.W. at 5033 n. 55, Leg. Hist. at 297.[9] Whatever balancing considerations must go into a determination that cotton dust poses "a significant risk of material impairment of health", cost is not one of them.

---

[9] *See, National Congress of Hispanic American Citizens* v. *Marshall*, 626 F.2d 882, 889 (D.C. Cir. 1979) holding the Secretary may rationally decide to regulate the more severe hazards first.

See also, Ethyl Corp. v. *Environmental Protection Agency*, 541 F.2d 1 (D.C. Cir. 1976). The Court of Appeals held the EPA Administrator was required to regulate fuel additives if they "will endanger the public health or welfare" under 42 U.S.C. § 7857f-6c (c)(2)(A). *The Court then agreed that the phrase "will endanger" meant "presents a significant risk of harm."* 541 F.2d at 13. (emphasis added). The Court then went on to hold:

> the public health may properly be found endangered both by a lesser risk of greater harm and by a greater risk of a lesser harm. (541 F.2d at 15. (Citation omitted))

Justice Stevens created the concept of significant risk to force OSHA to justify the need for new regulation, not the manner of regulation. 48 L.W. at 5030.

D. If Congress Had Intended a Quantitative Cost-Benefit Analysis Under § 6(b)(5) of OSH Act it Would Have so Stated

The cost benefit concept has been used since early 20th Century by Congress, to assist government in making analogous decisions about government public works projects. An early example is The Flood Control Act of 1936, 33 U.S.C. § 701(a):[10]

> "[T]he Federal Government should improve or participate in the improvement of navigable waters . . . for flood-control purposes if the benefits to whomsoever they accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected."

Historically Congress applied cost-benefit analysis to government projects, not to the development of regulations, properly noting that selecting and designing government projects, unlike regulations, involve tasks analogous to the investments of private firms.[11]

In two more recent statutes Congress has provided expressly that, in addition to being feasible, the regula-

---

[10] Other examples of legislation requiring cost-benefit analysis are The Rivers and Harbors Act of 1902, Pub. L. No. 57-154, § 3, 32 Stat. 372 (1902) and Rivers and Harbors Act of 1920, Pub. L. No. 66-263, § 2, 41 Stat. 1010 (1920). Public work agencies have used cost-benefit analysis since the late 19th century. Baram, M., *Cost-Benefit Analysis: An Inadequate Basis for Health, Safety, and Environmental Decisionmaking*, 8 Ecology L. Q. 493 (1980).

[11] See, Rogers, W., *Benefits, Costs and Risks: Oversight of Health and Environmental Decisionmaking*, 4 HARV. ENV. L. REV., 191, 210 (1980).

tions promulgated under the statute should reflect a balancing of costs and benefit.[12]

Congress has even passed statutes which require a cost-benefit analysis for certain regulations, but not for others under the same statute.[13]

In the absence of a clear mandate to force OSHA to utilize cost-benefit methodologies, the Court should not

---

[12] Energy Policy and Conservation Act of 1975, 42 U.S.C. § 6295 (c)(4)(D); Outer Continental Shelf Lands Act Amendments of 1978, 43 U.S.C. § 1347(b). The Energy Act provides that energy efficiency standards promulgated for certain products must not only be "economically feasible", but must, in addition, be such that "the savings in operating costs . . . outweigh" the adverse effects of the standard. Similarly, the Outer Continental Shelf Land Act Amendments provide that offshore drilling operations shall use:

> "the best available and safest technologies which the Secretary determines to be economically feasible, . . . except where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies." [43 U.S.C. § 1347(b)]

[13] *E.g.*, the Federal Water Pollution Control Act Amendments of 1972, as amended, 33 U.S.C. § 1251 *et seq.*, specifies that in setting effluent limitations to be achieved by 1977, the Environmental Protection Agency ("EPA") must require the use of the

> "best practicable control technology currently available (§ 1311 (b)(1)), and further that EPA's 'assessment of [that] technology shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from that application. . . .' [§ 1314(b)(1)(B)]. The latter requirement entails a 'limited cost-benefit analysis'." [118 Cong. Rec. 33696 (1972), discussed in *E.I. duPont de Nemours & Co.* v. *Train*, 430 U.S. 112, 129-130 (1977).]

Interestingly, the 1972 Amendments provide that the more demanding effluent limitations to be attained by 1983 should be based on "the best available technology economically achievable" (as amended, § 1311(b)(2)(A)), and under that provision, while costs are to be considered, "no balancing test will be required." 118 Cong. Rec. 22696 (1972). See *EPA* v. *National Crushed Stone Association*, —— U.S. ——, 49 LW 4008 (1980); *see, Weyerhaeuser Corp.* v. *Costle*, 590 F.2d 1011, 1044-46 (D.C. Cir. 1978).

require one. As Amici will show, such an approach would simply trade one set of problems for another.

II. APPLICATION OF COST-BENEFIT ANALYSIS TO OSHA STANDARDS IS INAPPROPRIATE

A cost-benefit analysis is one method of decisionmaking premised on the economic efficiency of competing alternative actions.[14] Economic efficiency is a concept which seeks to maximize the available resources in a free market economy assuming a particular distribution of income.[15] In the context of a cost-benefit analysis as to a public decision, efficiency is determined by a mathematical comparison between the dollar value of the benefits of a proposed action to its costs. The application of such an analysis to the process of promulgating occupational safety and health standards presents inherently difficult technical, methodological and moral problems. These problems are real and sufficiently well recognized that

---

[14] The traditional definition of cost-benefit analysis is that it is a process which "involves translating the attributable performances into dollar quantities. *See,* Baram, M., *Cost-Benefit Analysis: An Inadequate Basis for Health, Safety, and Environmental Regulatory Decisionmaking,* 8 Ecology L. Q. 473 (1980). This definition had its origin in the simple profit and loss accountings of business organizations.

For others, the phrase:

> ". . . refers to the systematic analysis and evaluation of alternative courses of action drawing upon the analytical tools and insight provided by *economics* and decision theory. It is a framework and a set of procedures to help organize the available information, *displaying trade-offs* and pointing out uncertainties." See, National Academy of Sciences, Decisionmaking for Regulating Chemicals in the Environment 17, 39 (1975) (emphasis added).

However defined, cost benefit analysis is an issue of form.

[15] Rogers, W., supra at 194 n.18.

this Court should not infer them from the statute absent express Congressional guidance. *Cf.*, *Vermont Yankee Nuclear Power* v. *NRDC*, 435 U.S. 519 (1978).

A. Technical Deficiencies Militate Against the Use of Cost-Benefit Analysis to Promulgate Occupational Health Standards

The major technical shortcoming of cost-benefit analysis is a limited and often inconclusive data base available in public health matters.[16] Other technical problems include; disagreement among experts on methods for using data, lack of consensus as to findings and their applicability to problems at hand and unquantifiable attributes.[17] Still another technical problem is the difficulty in putting a value on low probability, high cost events in view of diverse and changing needs.[18] Another difficult problem is preventing interest groups from exerting pressure to promote their interest through formula adjustments.[19]

Traditional cost-benefit analysis requires identification, quantification, classification, and monetization[20] of the cost and benefits of a proposed action. Each step, however, is permeated with the practical problems mentioned above that make application of cost-benefit analysis in the OSHA context inappropriate.

---

[16] *See, e.g.*, Chalfant, Hartmann & Blakeboro, *Recombinant DNA: A Case Study in Regulation of Scientific Research*, 8 Ecology L. Q. 55 (1979).

[17] Baram, M., *supra* at 483.

[18] *Id.* at 479.

[19] *Id.* at 480.

[20] Anderson, L. & Settle, R.R., *Benefit-Cost Analysis: A Practical Guide*, 1-2 (1977).

Characterization of costs and benefits is inherently difficult and subjective. Yet, identification of these is critical to the analysis. Inevitably, the analyst's personal values lead to different characterizations of an attribute.[21] Even where attributes are identifiable and characterizable, the decisionmaker still may exclude them from the calculations, if the contributions are too complex to measure, if the causal connection between action and attributes is tenuous, or if even they tilt the balances unfavorably.[22]

In the context of the cotton dust standard, the extent of byssinosis cannot be determined with sufficient precision for various reasons. There are a limited number of studies documenting the number of hazards faced by textile workers. 43 Fed. Reg. 27352-54. The extrapolations from the studies to the total work force were the subject of considerable controversy. 43 Fed. Reg. 27355-58. The intensity of the debate and the range of the numbers strongly suggest identification is a severe problem under these circumstances.

Assuming the actual risks could be accurately identified, complete quantification of the cotton dust standard's attributes would remain difficult. For reasons of convenience, benefit estimates are conservative and generally only represent direct income and medical cost savings.[23]

---

[21] *See*, Tribe, *Technology Assessment and the Fourth Discontinuity: The Limits of Instrumental Rationality*, 46 S. Cal. L. Rev. 617 (1973).

[22] *See*, Lovins, Cost-Risk Benefit Agreement in Energy Policy, 45 Wash. L. Rev. 911 (1977).

See also, Alexander, M. & S., Disaster as a Necessary Part Of Cost-Benefit Analysis, 197 Sci. 1160 (1977).

[23] Mendeloff, J., *Regulatory Safety*, MIT Press, Cambridge, Mass. (1979).

They do not include the losses to workers and families associated with premature death, pain and suffering, gains to employers from improved productivity, reduced absenteeism due to illness and worker turnover.

It is impossible to measure the pain and suffering caused by this disabling disease.[24]

It is also impossible to calculate the dollar value of byssinosis-related disruptions to victims' lives.[25]

Of course, whether an item is a cost or benefit may well depend entirely upon one's perspective. In the absense of burden shifting laws, the entire society has been forced to absorb enormous costs due to the occupational disease. Increased costs to government through income maintenance and medical aid programs due to byssinosis greatly exceeded the estimated cost of the Cotton Dust Standard.[26]

---

[24] Byssinosis victims describe the disease as feeling "like an accordian that had been played, you know, and was through—you were singing and playing and you were locked." Subcommittee of the Senate Committee on Appropriations, 95th Cong., 1st Sess., Special Hearing on Brown Lung (1978) "Like there was a band around my chest and back." *Id.* at 21. Another described it as a feeling "that I'm drowning." *Id.* at 21.

[25] Life at home is changed as the disease strains personal relations. What were considered life's necessities become impossible. One byssinosis victim noted that "I had gotten to where I wasn't able to go to church, I would be so sick." *Id.* at 21.

[26] *See*, Hughes, J., *Brown Lung Disability: Costs Compensation and Controversy An Explanatory Policy*, U.S. Dept. of Labor/ ASPER (June, 1979). This work contains a discussion of the government program costs due to Brown Lung disease. The author also discussed other cost items which should be included, but which generally are not, *e.g.*, loss of non-paid domestic work, loss due to early transfer to lower paying jobs, lost work days, etc. *Id.* at 11.

B. Monetizing Human Life Is a Necessary Part Of Any Overt Comparison of Health Benefit and Compliance Costs

Quantitative cost-benefit analysis requires valuing human life and other unquantifiable attributes, because both sides of any equation must be expressed in common terms. Cost-benefit analysis of health related decisions would be appropriate only if there was a socially acceptable method to measure both the cost and benefits and to express them in dollar terms.[27] But since there is no socially acceptable way to perform this reduction, then the analysis fails before it begins, or by definition is unacceptable as a method of agency decisionmaking. The mere act of *attempting* to engage in a cost-benefit analysis for occupational health regulations, does not make any easier the problems of making a value judgment about the worth of human life, distributional fairness and discount rate problems.[28] These problems are inherent in any effort to expressly balance costs against benefits even if the issues are not formally reduced to dollar numbers and compared as part of agency decisions on the promulgation of regulations.

Analysts in the field always have had serious difficulty in quantifying human life.[29] Some analysts re-

---

[27] Baram, M., *supra*, at 483.

[28] The ATMI brief suggests a formal comparison of costs and benefit may have a "salutory effect", even if the result is not clearly useable. Yet ATMI cannot describe concretely how decisionmaking is improved by such comparisons. ATMI Brief at 40.

[29] No accepted figures for the value of life exist; nor should we expect them to exist . . . (F)actors such as age or occupation will influence the money value placed on costs incurred . . . (If) children and the poor are victims, remedial action may not seem justified from the calculation of cost-benefit ratios,

frain from placing their own value judgments on the value of human life and redirect their analysis [30] while others recommend caution in the use of cost-benefit analysis [31] or avoid quantification altogether,[32] Congress recognized the difficulty and deliberately excluded cost-benefit analysis from the OSH Act. This Court now has been called upon to second-guess Congress and decide whether a cost-benefit analysis is appropriate in addressing occupational health and safety problems. The cost-benefit approach is flawed by the philosophical problem of placing a dollar value on human life. Even if the Court should want to apply it to this occupational health standard, there is no generally acceptable method for putting a price tag on life.

In the occupational coke oven emission standard, OSHA recognized that no generally acceptable methodology exists for putting a price on life.[33] Several methods for valuing human life have been advanced.[34] The human capital

---

when at the same time, if the victims had been of a differing age or income level, action would be more readily supportable."

Prunella, W., *A Quantative Assessment of Cost-Benefit Analysis and Its Application in the Area of Product Safety* 3-4 (report submitted to Consumer Product Safety Commission—Economic Program Analysis Division, Feb. 1978).

[30] *See,* Chalfant, Hartmann & Blakeboro, *supra*; Lawrence, W., *Of Acceptable Risk* (1976).

[31] Baram, M., *supra,* at 482 n. 38.

[32] *Id.*, at 483 n. 39.

[33] 41 Fed. Reg. 46742.

[34] Additional approaches may be termed the "willingness to pay model" and the "statistical life method". Under the former, a life is worth the price affected groups are willing to pay to preserve that life. The method depends on the income distribution of the group at the time the decision is made. Ruttenberg, R., Regulatory Controversy: The Case of Health and Safety. 4-5 (unpublished paper) Feb. 1980.

The basic principle of the statistical life method, is whether it is acceptable to place a value on a small risk of dying based on sup-

approach is generally used. Under this system an employed person is viewed as the sum of the lifetime stream of output. That is, this model values human life on the basis of an individual's estimated earnings capacity over his remaining lifetime. This approach excludes all intangibles and under-values some groups relative to others because earnings do not necessarily reflect one's ability to produce. The human capital model also mirrors the discrimination in today's society. Based solely on earnings potential, men as a group are more valuable than women, white more valuable than blacks and middle age persons are more than the very young and those who have retired.

Another technical concern relates to the choice of a discount rate. A cost benefit analysis would force the agency to trade future lives lost for costs today through the selection of a discount rate. It is obviously inappropriate for OSHA to be empowered to select the rate at which long-run levels of mutagenic, carcinogenic or toxic effects from hazardous substances are chosen for generations to come. Congress and the courts have not yet decided on a standard value for future dollar levels of given attributes. If a cost-benefit analysis were required of OSHA, this failure would abdicate this legislative decision to individual analysts.

Any quantitative cost-benefit balancing test is clearly subject to abuses. Users of the test can play the numbers

---

posed wage premiums and then multiply that value by the inverse of the risk in question to find the value of life. If workers are willing to accept a 1 in 1,000 increase in the risk of dying each year for a wage bonus of $200 then the value of human life is said to be $200,000. The flaw in this approach is that it assumes that people can accurately and knowledgeably measure small risks. Adams, J.G.U. . . . *And How Much For your Grandmother?* 6 Environment and Planning A 619 (1974).

The users of the statistical life method must also presume that workers possess sufficient economic power to bargain with employers over the wage premium.

game to arrive at decisions promoting their best interest.[35] By manipulating the discount rate, assigning arbitrary values to identified attributes, excluding attributes that may tilt the scale against preferred action and using self-serving assumptions about distributional fairness, analysts confirm pre-selected opinions instead of analyzing options.[36] This new realm of legislative policymaking should be given to OSHA absent specific congressional guidelines. *Cf., Vermont Yankee Nuclear Power* v. *N.R.D.C.*, 435 U.S. 519 (1978).

OSHA amply explained the reasons for rejecting formal cost-benefit analysis. In the statement accompanying promulgation of the coke oven emissions standards, 41 *Fed. Reg.* 46742 at 46748-46751, summarized and incorporated by reference in the cotton dust preamble, 43 *Fed. Reg.* 27379, the agency fully discussed the shortcomings of the formal methods, why Congress refused to require their use, and why, to the extent the matter is left to OSHA's discretion, the agency declines to use them.

In the case of the cotton dust standard, the evidence in the record indicates that the costs of compliance are not overly burdensome to industry. Having determined that the benefits of the proposed standard are likely to be appreciable, OSHA is not obligated to carry out further

---

[35] Note, *The Concorde Calculus*, 45 Geo. Wash. L. Rev. 1037 (1977). The article examined the utility of cost benefit analysis in agency decisionmaking by analyzing former Secretary of Transportation William T. Coleman's decision to permit limited commercial service to United States by Anglo-French Concorde supersonic transport (SST). It suggests that although cost benefit analysis endowed the Concorde decision with an aura of legality and legitimacy, the nature of the issues in the Concorde decision were not determined by the cost benefit analysis, but rather was a subjective policy choice on which the focus of decisionmaking authority determined the results of the analyses.

[36] Zimmerman, B., *Risk-Benefit; The Cop-out of Governmental Policy*, 14 Trial 42, 46 (1978):

exercises toward more precise calculations of benefit which would not significantly clarify the ultimate decision. Previous attempts to quantify benefits as an aid to decision making in setting health standards have not proved fruitful. 41 *Fed. Reg.* 46742.

III. THE LOWER GRADES OF BROWN LUNG DISEASE ARE MATERIAL IMPAIRMENTS OF HEALTH AND FUNCTIONAL CAPACITY AND WERE THEREFORE PROPERLY A BASIS FOR REGULATION

In an effort to affect the outcome of their proposed balancing test, petitioners argue that the only adverse health effects which are permanently and irreversibly disabling are "material impairments of health". They would draw the conclusion therefrom that the standards should not be set to prevent the early stages of occupational disease.

Specifically, ATMI urges that this Court not consider the early stages (Grades 1/2, 1 and 2) of byssinosis to be material impairments of health because the symptoms, disabilities and decreased lung functions are reversible at those stages. *See*, ATMI Brief, at 49, *AFL-CIO* v. *Marshall*, 617 F.2d at 654. While the Court below did not address the issue of whether the lowest grade standing alone constitutes an impairment, 617 F.2d at 654 n.83, it is an important question before this Court.[37] The implications are far reaching. The ATMI approach would forever exclude reversible damage, early stages or non-disabling effects of disease from

---

[37] ATMI argues that since the low grades of diagnosed byssinois should not be considered material impairment, they are not harms which can be regulated. Unregulable harms, they argue, cannot give rise to cognizable benefits. The effect of this conclusion is to alter the outcome of the balancing task in which petitioners assert the Secretary should have engaged. ATMI Brief at 50-51.

(a) being overtly regulated and (b) being added on the benefit side of any balancing.

This is clearly contrary to any meaningful reading of the terms "material impairment of health" in § (6) (b) (5) and in the legislative history.

The legislative history of the Occupational Safety and Health Act of 1970 contains explicit references to cotton dust as an example of a hazard Congress wanted OSHA to regulate. The Senate report on the original Williams bill refers to the age of the cotton dust problem, and the fact that 100,000 active or retired workers were currently suffering from byssinosis. S. Rep. 91-1282, Leg. Hist. at 143. Several senators and representatives also commented that cotton dust exposure should be regulated.[38]

Congress also contemplated that progressive health problems would be regulated by OSHA before they became permanently disabling or fatal. Senator Dominick, who drafted the change in § 6(b) (5) from "any impairment" to "any material impairment" stated *after* he proposed the change:

> What we were trying to do in the bill . . . was to say that when we are dealing with toxic agents or physical agents, we ought to take such steps as are feasible and practical to provide an atmosphere within which a person's health and safety would not be affected. [Leg. Hist. at 602 (emphasis added)].

Senator Williams, Senate sponsor of the legislation, accepted the proferred Dominick amendment and also agreed with another statement by Senator Dominick that:

> the Secretary has got to use his best efforts to promulgate the best available standards, . . . so that we

---

[38] *E.g.*, Senators Muskie, Hart, *Leg. Hist.* at 513, 517; and Representatives Daniels, Udall, *Leg. Hist.* at 1002, 1045.

> can get at something which might not be toxic now, if he works in it a short time, but if he works in it the rest of his life it might be very dangerous. [*Leg. Hist.* at 503].

These comments among others,[39] strongly suggest Congress wanted toxic substance risks to be regulated before any symptoms occurred, choronic or acute, and wanted standards to protect workers for their full working lives. It is, therefore, irrelevant to the materiality of a risk, that the symptoms and objective dysfunctions associated with a disease in the early stages may be reversible, or even so mild and complex that the patient himself does not know he or she is sick. *Accord: United Steelworkers of America* v. *Marshall*, —— F.2d ——, 8 BNA OSHC 1810, 1853-53:[40]

> Section 6(b)(5) empowers OSHA to get a PEL that prevents the subclinical effects of lead that lie in a continuum shared with overt lead disease. [8 BNA OSHC at 1853].

In this case, OSHA found that the early stages of byssinosis were part of "a continuum of disease", 43 Fed. Reg. 27354. OSHA found persuasive "arguments for adopting a cotton dust regulation which protects workers from the acute consequences of cotton dust exposure" [*id.*], because the stages of acute symptoms and

---

[39] See Comments of Senator Yarborough Amici, at 9.

Senator Hart also spoke in favor of the amended bill noting some substances "gradually eat away as [workers'] vitality leaving them often victims of *painful* diseases, such as emphysema, byssinosis, and asbestosis. *Leg. Hist.* at 517 (emphasis added).

[40] But see, *Texas Independent Ginners Assn.* v. *Marshall*, —— F.2d ——, 8 BNA OSHC 2205.

reversible losses of lung function were "precursors of chronic obstructive pulmonary disease." *Id.* The Court below expressly upheld OSHA's progressive disease analysis. *AFL-CIO* v. *Marshall*, 617 F.2d at 654.

The petitioners' brief, before this Court, accepts this analysis.

> "Although it is not known what component of cotton dust causes byssinosis there is general agreement that some workers exposed to high enough concentrations of cotton dust will develop some symptoms of Grade 1/2 byssinosis and that, *if exposure continues for long enough* the condition could progress, over time, to the more severe chronic and disabling stage." [ATMI Brief at 5-6 (emphasis added)]

Even if the "progressive" nature of byssinosis were not clearly established, the earlier quoted legislative history would support the regulation of painful and incapacitating symptoms and lung function losses of the earlier grades of byssinosis. Amici at 9, 22, 23. Those problems were clearly established in the record [41] and

---

[41] In addition to their irritative stage, NIOSH found

> "temporary disablement" stage which can cause "temporary incapacity with intervals of absence from work, which are of short duration but increases in frequency and level in time to partial incapacity." As well as a "total disablement" stages where chronic bronchitis and emphysema exist". This condition is "incurable" and may "lead ultimately to cardiac failure."

Criteria Document at 25-26.

NIOSH also stated that asymptomatic individuals who have reproducible 10% or greater decrement in a Forced Expiratory Volume Test should be managed as if they have byssinosis. *Criteria Document* at 31.

referenced in OSHA's statement of reasons. 43 Fed. Reg. 27361-54.[42]

From a worker's point of view, any "impairment" of health which forces him or her to cease work for even short periods of time, is a "material impairment of health". Similarly, any loss of one's breathing function which slows oxygen intake into the body and may be accompanied by pain or "chest constriction" is a "material impairment" of "functional capacity". OSHA found both problems to exist at the earlier stages. 43 Fed. Reg. 27362, 54.

Since the statute is designed to "assure so far as possible every working man and woman in the nation safe and healthful working conditions", § 2(b), 29 USC 651 (b), the issue of "material impairment" should be governed from the perspective of those to be protected. The Secretary should be given sufficient discretion to make the policy determination of materiality contemplated by the statute given his obligation to interpret and apply the statute. *Whirlpool Corp.* v. *Marshall*, —— U.S. ——, 8 BNA OSHC 1001 (1980).[43]

---

[42] The difference between Grade 3 and Grade 2 is the controlability of the symptoms. The difference between Grade 2 and Grade 1 is the frequency with which these conditions are experienced while at work. Petitioners implicitly support this view when they argue that "a person exhibiting Grade 1/2 symptoms is not sick, impaired or disabled" but do not so argue for victims of Grades 1 and 2. ATMI Brief at 5.

[43] The Secretary may put "gloss on the Act" so long as it is not inconsistent with the language, structure and legislative history. 8 BNA OSHC at 1004.

IV. CONCLUSION

For the above stated reasons, this Court should affirm the decision below.

Respectfully submitted,

J. DAVITT MCATEER
CENTER FOR LAW AND SOCIAL POLICY
1751 N Street, N.W.
Washington, D.C. 20036
(202) 872-0670

JOHN A. FILLION
General Counsel
CLAUDE D. MONTGOMERY
Assistant General Counsel
INTERNATIONAL UNION, UAW
8000 E. Jefferson
Detroit, Michigan
(313) 926-5216

Attorneys for Amici Curiae

Of Counsel:

DEBORAH WEIMER
BLAIR LEVIN
Brown Lung Legal Center
528 Knox Abbott Dr.
Cayce, S.C. 29033

DATED: December 20, 1980

No. 79-1429

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., *et al.*,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent.

On Writ Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF THE BUNKER HILL COMPANY AS AMICUS CURIAE

EDWIN H. SEEGER
Counsel of Record

PRATHER SEEGER DOOLITTLE & FARMER
1101 Sixteenth St., N.W.
Washington, D.C. 20036
202-296-0500

WILLIAM F. BOYD
BROWN, PEACOCK, KEANE & BOYD
P.O. Box 659
Kellogg, Idaho 83837
208-784-1105

Attorneys for The Bunker Hill Company

November 20, 1980

PRESS OF BYRON S. ADAMS PRINTING, INC., WASHINGTON, D.C.

TABLE OF CONTENTS

PAGE

INTEREST OF AMICUS CURIAE 1

ARGUMENT 3

The Rulings Of The D.C. Circuit In The *Cotton Dust* and *Lead* Cases Are At Odds With The Occupational Safety And Health Act Because They Have The Practical Effect Of Freeing OSHA From The Act's Requirement That Health Standards Must Be "Feasible" And "Reasonably Necessary" 3

A. The Definition Of "Feasible" Adopted By The Court Of Appeals In *Cotton Dust* And *Lead* Affords OSHA Excessive Power Not Contemplated By Congress 4

B. The Decisions Of The Court Of Appeals In The *Cotton Dust* And *Lead* Cases Do Not Impose Sufficiently Strict Requirements On OSHA As To The Nature Of The Findings It Must Make To Support A Standard 5

1. OSHA Must Be Required To Show That Its Standards Are Economically Feasible... 5

2. If Industry Is To Be Forced To Meet OSHA's Standards Through Engineering Controls, OSHA Must Be Required To Show That Such Controls Are Available... 8

3. The *Cotton Dust* and *Lead* Decisions Are In Error In Not Requiring OSHA To Weigh Costs And Benefits 10

CONCLUSION 11

TABLE OF AUTHORITIES

CASES: PAGE

ASARCO Inc. v. *OSHA* (9th Cir. No. 78-1959, decision pending) 2

Bunker Hill Co. v. *EPA*, 572 F.2d 1286 (9th Cir. 1977) . 9

Essex Chemical Corp. v. *Ruckelshaus*, 486 F.2d 427 (D.C. Cir. 1973), *cert. denied*, 416 U.S. 969 (1974) . 9

Industrial Union Dep't v. *American Petroleum Institute*, 100 S.Ct. 2844 (1980) 2, 3, 10

Portland Cement Ass'n v. *Ruckelshaus*, 486 F.2d 375 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974) . 9

Texas Independent Ginners Ass'n v. *Marshall*, _____ F.2d _____ (5th Cir. No. 78-2633, November 14, 1980) 10-11

United Steelworkers of America v. *Marshall*, _____ F.2d _____ (D.C. Cir. No. 79-1048, August 15, 1980) 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

STATUTES:

Occupational Safety and Health Act of 1970 3

Section 3, 29 U.S.C. §652 3

Section 6, 29 U.S.C. §655 3

Clean Air Act 9

Section 111, 42 U.S.C. §7411 9

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., *et al.*,

Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR,

Respondent.

On Writ Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF THE BUNKER HILL COMPANY AS AMICUS CURIAE

The Bunker Hill Company respectfully tenders this brief as amicus curiae for consideration by the Court. Bunker Hill supports the position presented by the American Textile Manufacturers Institute, Inc., and the other petitioners, and urges the Court to reverse the decision of the United States Court of Appeals for the District of Columbia Circuit in this case.

INTEREST OF AMICUS CURIAE

The Bunker Hill Company operates a large primary lead and zinc smelting complex in Kellogg, Idaho, and is one of the Nation's leading producers of those metals. The Company is thereby subject to the full range of safety and health regulations promulgated under the Occupational Safety and Health Act of 1970, 29 U.S.C. §§651 *et seq.*

Bunker Hill accordingly has a direct interest in the outcome of this case in which the Court will consider OSHA's cotton dust standard and will rule for the first time on the provisions of the Act which state that OSHA's health standards must be "feasible." Quite apart from the general interest it has in such a ruling as a company regulated under the Act, Bunker Hill has an immediate interest by virtue of the fact that it is a party to two cases involving OSHA health standards: *ASARCO Inc.* v. *OSHA* (9th Cir. No. 78-1959, decision pending), and *United Steelworkers of America* v. *Marshall*, _____ F.2d _____ (D.C. Cir. No. 79-1048, August 15, 1980).

In the latter case, which we will refer to as "the *Lead* case," the court of appeals sustained an OSHA regulation imposing extremely costly medical removal provisions on primary lead smelters and other lead producing and consuming industries and requiring them to meet stringent limitations on in-plant airborne lead concentrations despite the fact that OSHA had made no estimate of the economic impact of these requirements and was unable to point to any technology that would enable primary lead smelters to meet the limitations imposed by the regulation. The Court will shortly receive one or more petitions requesting it to review the decision of the court of appeals on the grounds that it raises important issues bearing on the meaning of the terms "feasible" and "reasonably necessary" in the standard-setting provisions of the Act that are not raised in the *Cotton Dust* case. Hence, consideration of the *Lead* case is essential if the Court is to complete its effort to clarify OSHA's standard-setting powers which began with the *Benzene* case, *Industrial Union Dep't* v. *American Petroleum Institute*, 100 S.Ct. 2844 (1980), and is continuing with the *Cotton Dust* case.

However, a decision in *Cotton Dust* will likely be forthcoming before the Court has an opportunity to consider the *Lead* case, and this brief is therefore designed to make the Court aware of the interrelationship between the two cases so that any ruling in *Cotton Dust* stating what OSHA has to do to comply with the feasibility and reasonable necessity requirements of the Act will be drawn with the *Lead* case in mind.

ARGUMENT

The Rulings Of The D.C. Circuit In The *Cotton Dust* And *Lead* Cases Are At Odds With The Occupational Safety And Health Act Because They Have The Practical Effect Of Freeing OSHA From The Act's Requirement That Health Standards Must Be "Feasible" And "Reasonably Necessary."

In the *Benzene* case, the Court struck down OSHA's standard stating that "it is unreasonable to assume that Congress intended to give the Secretary [of Labor] the unprecedented power over American industry that would result from the Government's view of §§3(8) and 6(b)(5)" of the Occupational Safety and Health Act, 100 S.Ct. at 2865. The Court was referring in that case to the Government's view that OSHA did not have to find that a significant risk of harm to health existed before imposing a new health standard. The Government's view of OSHA's powers under those same sections of the Act where issues of feasibility and the relationship of costs to benefits are concerned is similarly much too expansive, and it is clear that OSHA, its reviewing courts and persons subject to its regulations need from the Court not only a definition of the term "feasible" as it appears in the Act but also precise guidelines as to what findings OSHA has to make in

order to support its conclusion that a given standard is feasible and reasonably necessary.

A. The Definition Of "Feasible" Adopted By The Court Of Appeals In *Cotton Dust* And *Lead* Affords OSHA Excessive Power Not Contemplated By Congress.

The court of appeals panel that heard *Cotton Dust* held that a standard is feasible even if it forces an indeterminate number of employers out of business, 617 F.2d at 655. In *Lead*, which was decided on a two-to-one vote, the panel majority held that a standard is feasible as long as it does not threaten "massive dislocation" to or "imperil" the affected industry (slip op., pp. 143-44). Hence, both decisions would permit OSHA to put a number of companies out of business provided the number fell short of massive dislocation and did not mean that the entire industry was imperiled. We submit that to interpret "feasible" to mean feasible for some but not for others, and to read the term as allowing OSHA to shut down any number of companies as long as the total number is not "massive," renders the term meaningless.

Bunker Hill urges the Court to hold that there is no basis for concluding that when Congress stated that standards must be "feasible" it meant feasible only for some, and that OSHA may only adopt a standard if the Agency is able to show that, with at most rare exception, the standard can be achieved by the companies subject to it.

B. The Decisions Of The Court Of Appeals In The *Cotton Dust* And *Lead* Cases Do Not Impose Sufficiently Strict Requirements On OSHA As To The Nature Of The Findings It Must Make To Support A Standard.

Much of industry's opposition to OSHA's new health standards stems from the fact that, as in the *Cotton Dust* and *Lead* cases, OSHA's standards are designed to protect workers from biological responses or subclinical effects that have not been shown to be harmful to health and OSHA has determined as a matter of policy, and without examining how the costs and benefits of that policy compare with alternative approaches, that these standards must be met through extremely costly engineering controls and work practices such as job rotation rather than by far less expensive devices such as respirators and medical surveillance. While we urge that OSHA's approach is improper in any event, the problem is compounded by the fact that OSHA has not only chosen to impose complex and costly technological and work practice requirements on industry, but pays mere lip-service to the requirement that it make findings, based on "substantial evidence," demonstrating that such requirements are feasible. As we will show below, the decisions of the court of appeals in the *Cotton Dust* and *Lead* cases are in error in failing to enforce the requirement that such findings be made.

1. OSHA Must Be Required To Show That Its Standards Are Economically Feasible.

The *Cotton Dust* and *Lead* decisions permit OSHA to determine that a standard is "feasible" based on the most cursory examination of its economic impact and without consideration of the cumulative economic impact

of other standards. Indeed, the panel majority's decision in the *Lead* case would permit OSHA to adopt a standard without making any estimate of the cost of complying with it.

Thus, although OSHA anticipated that it would take ten years for primary lead smelters to install the controls OSHA believed would reduce worker blood lead concentrations to what the Agency considered acceptable levels, and that it would take other segments of the lead industry as long as five years to do so, OSHA required the entire industry to institute at once a medical removal program whereby workers with blood lead levels deemed excessively high by the Agency are removed from the workplace and guaranteed full pay and seniority. Yet, OSHA at no time calculated the cost of such a program, and there is not a word in the panel majority's opinion responding to industry's objections to that omission.

Moreover, no estimate was made by OSHA of the cost of rebuilding plants to install the new technology OSHA believed would enable companies to meet the standard, though the standard contemplates that industry would have to install new processes and hence rebuild its plants to meet the standard (slip op., pp. 172-74).[1] That omission was condoned by the panel majority on the ground that "[OSHA's] need to force experimental technology and to leave the choice of means to industry makes such a goal [developing cost estimates] quixotic" (slip op., p. 166).

---

[1] The panel majority's decision discusses at some length OSHA's estimates of the cost of a much less stringent standard that OSHA originally considered and then abandoned. The discussion sheds no light on the feasibility of the standard OSHA ultimately adopted which the panel majority concedes "greatly increases the number of employees affected . . . as well as the . . . economic and technological demands on industry" (slip op., pp. 46-47).

Ultimately, the panel majority employed the same survival test that the panel in *Cotton Dust* did and concluded that no showing had been made that the affected industries "could not afford these costs" (slip op., p. 166). Elsewhere, the decision of the panel majority suggests that OSHA's procedures and rules afford companies potential relief from standards that prove infeasible. These procedures and rules include variances, the opportunity to use respiratory protection to meet a standard where engineering controls prove infeasible, and the availability of preenforcement review to test feasibility in the courts — all of which, the panel majority concluded, "greatly ease OSHA's preliminary burden in proving feasibility" (slip op., p. 162).

Bunker Hill submits that the requirement of the Act that standards must be feasible and that OSHA's determinations must be based on substantial evidence lose their effect when economic feasibility is equated with mere survival, as the decisions in the *Cotton Dust* and *Lead* cases do, and when the requirements of an OSHA regulation are determined to be economically feasible in the absence of any estimate of their costs or any analysis of the impact of those and other environmental costs on the affected industry. Moreover, nothing in the statute suggests that Congress intended that OSHA would be free, as the panel majority in the *Lead* case suggests, to conclude that the requirements of a health regulation are feasible in the absence of evidence of their economic impact, and to leave more careful assessments of feasibility to some future enforcement or variance proceedings.

Indeed, what is urgently required from the Court is a ruling that in order to meet the feasibility and substantial evidence tests imposed by the statute, OSHA must produce financial projections demonstrating that the

requirements of the standard, when taken together with other regulatory demands on the affected industry, will not weaken its competitive position.

2. If Industry Is To Be Forced To Meet OSHA's Standards Through Engineering Controls, OSHA Must Be Required To Show That Such Controls Are Available.

OSHA's indifference to questions of economic feasibility is accompanied by an inclination to impose technological requirements without finding they can be met. Thus, in the *Lead* case, OSHA was unable to point to any technology that would enable primary lead smelters to meet its lead standard, and instead afforded the industry ten years in which to develop technology capable of meeting the standard.

The majority decision in the *Lead* case upheld this approach on the ground that "American industry is capable of reaching virtually any low air-lead level at which it aims," and that "newly conceived experimental technology for primary smelters, most notably a new hydrometallurgical method of recovering lead from galena concentrate," though only "developed on the laboratory scale," held "great promise" that the standard could be met within ten years (slip op., p. 174).

There is no basis in the Act or in common sense for the concept that a standard is technologically feasible as long as industry is given enough time to develop the technology and there is at least the prospect that by then new extraction processes — that have yet to prove workable much less economically competitive — may be developed. Moreover, the majority's interpretation of what is meant by technological feasibility is in conflict with other judicial interpretations of that term. Thus, in

Bunker Hill Co. v. *EPA*, 572 F.2d 1286 (9th Cir. 1977), the court overturned a regulation imposing on the Company emission limitations that EPA conceded could not be met with existing technology but might be met by employing a so-called sulfur burner. The court held that the record

> "merely establishes that [the] sulfur burner proposal might work. As we noted above, this is not enough. The record must establish that the required technology is feasible, not merely *possibly* feasible. Approval of EPA's standards on the basis of this record would seriously risk closing down a major smelting operation on the strength of a showing that does no more than demonstrate that the technology on which EPA relies is only 'theoretical or experimental' " (572 F.2d at 1301).

Decisions under Section 111 of the Clean Air Act, 42 U.S.C. §7411, which has to do with the establishment of performance standards for entirely new sources, place similar restraints on administrative guesswork. See *Portland Cement Ass'n* v. *Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974) (" '[i]n order to be considered "available" the technology may not be one which constitutes a purely theoretical or experimental means of preventing or controlling air pollution' "); *Essex Chemical Corp.* v. *Ruckelshaus*, 486 F.2d 427, 433 (D.C. Cir. 1973), *cert. denied*, 416 U.S. 969 (1974) (in order to be considered "available" technology, the system must be one "which has been shown to be reasonably reliable, reasonably efficient").

While the cited cases arose under the Clean Air Act, they involve the setting of standards limiting airborne concentrations of a pollutant just as the *Cotton Dust* and *Lead* cases do, and hence the statements of the

reviewing courts requiring EPA to base standards on demonstrated technology are directly in point. Bunker Hill would urge the Court to articulate a similar rule directing OSHA to base its standards on technology that has been demonstrated to be workable and economic.

3. The *Cotton Dust* And *Lead* Decisions Are In Error In Not Requiring OSHA To Weigh Costs And Benefits.

As we have pointed out above, OSHA has refused to analyze the relative costs and benefits of alternative approaches to meeting health goals. The *Cotton Dust* panel sustained OSHA's position, holding, for example, that OSHA's rejection of respirator protection as a means of protecting workers was proper since it was based on sound "policy considerations," 617 F.2d at 653. Likewise, the panel majority in the *Lead* case not only was undisturbed by OSHA's failure to ensure that the costs of the lead standard bore a reasonable relationship to its benefits, but held that OSHA's requirement that inplant airborne lead concentrations not exceed a specified level was "reasonably necessary" even though there was no evidence of "the actual incidence of significant health effects at the old and new [permissible air lead concentrations]" (slip op., p. 110).

Bunker Hill urges that Mr. Justice Powell was correct when he stated in his concurring opinion in the *Benzene* case that "the statute requires the Agency to determine that the economic effects of its standard bear a reasonable relationship to the expected benefits" and that a standard cannot be considered "reasonably necessary" if the standard "calls for expenditures wholly disproportionate to the expected health and safety benefits," 100 S.Ct. at 2877. See also *Texas Independent*

Ginners Ass'n v. *Marshall*, _____ F.2d _____ (5th Cir. No 78-2663, November 14, 1980).

The requirement that relative costs and benefits be assessed is particularly urgent in the *Cotton Dust* and *Lead* cases where OSHA's standards were set at extremely low levels to protect workers from subclinical effects or biological responses where there is no clear evidence of significant risk. See *Cotton Dust*, 617 F.2d at 654-55; *Lead*, slip op. at 115 ("here . . . OSHA is acting to prevent, not overt early symptoms of a disease, but subclinical effects"); *id.* at 128 ("OSHA's case . . . ultimately rests on its theory of subclinical effects").

CONCLUSION

In the *Cotton Dust* and *Lead* cases, the court of appeals has for all practical purposes supported OSHA's view that the establishment of health standards is a discretionary act, and that the Agency is free to impose extremely stringent standards designed to protect workers from health effects not shown to be serious without determining how industry will meet the standards, what it will cost industry to do so or whether there are not more efficient and less expensive ways of ensuring the protection of worker health. Had Congress intended the Agency to have that freedom, it would not have included in the statute the requirement that standards be "feasible" and "reasonably necessary" and that OSHA's findings in support of a standard be based on "substantial

evidence." It is essential that the Court reinforce these limitations on OSHA's powers.

Respectfully submitted,

EDWIN H. SEEGER
WILLIAM F. BOYD

Attorneys for The Bunker Hill Company

November 20, 1980

No. 79-1429, 79-1583, 79-1789

MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC., *Petitioners,*

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES OF LABOR, *Respondent.*

On Writ Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF CHAMBER OF COMMERCE OF THE UNITED STATES AS AMICUS CURIAE IN SUPPORT OF PETITIONERS

STEPHEN A. BOKAT
Counsel of Record
STANLEY T. KALECZYC
NATIONAL CHAMBER
LITIGATION CENTER, INC.
1615 H Street, N.W.
Washington, D.C. 20062
(202) 659-3186

PRESS OF BYRON S. ADAMS PRINTING, INC., WASHINGTON, D.C.

TABLE OF CONTENTS

	PAGE
INTEREST OF THE AMICUS CURIAE	1
SUMMARY OF ARGUMENT	4
ARGUMENT	5
I. Assessing Benefits In Light Of The Costs Imposed On An Industry Is Consistent With The Act's Purposes	5
II. Consideration Of Cost And Benefit Enter Into All Aspects Of Our Lives	8
III. The District Of Columbia Circuit's Holding That OSHA Standards Are Economically Feasible So Long As The Affected Industry Is Not Put Out Of Business Is Erroneous	11
IV. OSHA Has Unreasonably Refused To Consider Whether There Is A Reasonable Relationship Between The Costs Imposed By A Standard And The Benefits Conferred In Determining How To Regulate Toxic Substances	13
CONCLUSION	17

TABLE OF AUTHORITIES

CASES: PAGE

A.P.I. v. *OSHA*, 581 F.2d 493 (5th Cir. 1978) 2, 3, 16

AFL-CIO v. *Marshall*, 617 F.2d 636, 661 (D.C. Cir. 1979) 3, 11, 12

Chrysler Corp. v. *Brown*, _____ U.S. _____, 60 L.Ed.2d. 208 (1979) 2

Continental Can Co., 4 BNA OSHC 1541, 1976-77 CCH OSHD ¶ 21, 009 (1976) 13, 14, 15

First National Bank of Boston v. *Bellotti*, 435 U.S. 765 (1978) 2

H & H Tire Company v. *Department of Transportation*, 471 F.2d 350, 357 (7th Cir. 1972) 11

Industrial Union Department, AFL-CIO v. *American Petroleum Institute*, _____ U.S. _____, 65 L.Ed.2d. 1010 (1980) 2, 3, 7

Marshall v. *Anchorage Plastering*, 570 F.2d 351 (9th Cir. 1978) 2

RMI Company v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979) 15

Samson Paper Bag Company, Inc., 8 OSHC 1515 (1980) 14

Turner Co. v. *Secretary*, 561 F.2d 82 (7th Cir. 1977) 15

Whirlpool v. *Marshall*, _____ U.S. _____, 63 L.Ed.2d 154 (1980) 2

STATUTES & REGULATIONS:

Motor Vehicle Safety Standards

15 U.S.C. 1381 11

15 U.S.C. 1391(2) 11

15 U.S.C. 1391(f) 11

Consumer Product Safety Act 15 U.S.C. 2051 et seq.

15 U.S.C. 2051(b)(1) 9

15 U.S.C. 2056 9

Table of Authorities Continued

STATUTES AND REGULATIONS: PAGE

Occupational Safety & Health Act of 1970

29 U.S.C. 651 ..... 5, 8

29 U.S.C. 652(5) 2

29 U.S.C. 652(8) 5, 9

29 U.S.C. 655(b)5 ..... 6, 9

29 U.S.C. 655(g) 15

MISCELLANEOUS

Affleck, "Towards Realistic Risk Benefit Decisions," New York Times, (April 29, 1979) 4

Booz, Allen & Hamilton, Inc., Preliminary Estimates of Direct Compliance Effects of OSHA's Generic Carcinogen Proposal on Substance Producing and Using Industries (February 1978) 2

Currie, "OSHA," American Bar Foundation Journal (1976) 7

41 Fed. Reg. 3186 (July 30, 1976) 10

42 Fed. Reg. 34289 (July 5, 1977) 10

43Fed. Reg. 11100 (March 16, 1978) 11

44 Fed. Reg. 9992 (February 15, 1979) 10

Hapgood, "Risk-Benefit Analysis, Putting a Price on Life," The Atlantic (January, 1979) 8

Scheibla, "The Benzene Case, Its Outcome Will have a Major Impact on Federal Regulation," Barron's (January 29, 1979) 4

Wheeler, "Cost-Benefit Analysis on Trial: A Case of Delusion and Reality," National Law Journal (October 20, 1980) 7

Wheeler, "The Public's Costly Mistrust of Cost-Benefit Safety Analysis," National Law Journal (October 13, 1980) 9

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

No. 79-1429, 79-1583, 79-1789

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., MILLIKEN & COMPANY ARKWRIGHT MILLS, SPARTAN MILLS, BLAIR MILLS, INC., HERMITAGE, INC., DAN RIVER, INC., CONE MILLS CORPORATION, MAYFAIR MILLS, SPRINGS MILLS, INC., RIEGEL TEXTILE CORPORATION, FIELDCREST MILLS, INC., AND WEST POINT-PEPPERELL, INC., *Petitioners,*

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES OF LABOR, *Respondent.*

On Writ Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF CHAMBER OF COMMERCE OF THE UNITED STATES AS AMICUS CURIAE IN SUPPORT OF PETITIONERS

INTEREST OF THE AMICUS CURIAE[1]

The Chamber of Commerce of the United States is the largest business federation in the United States, consisting of over 98,000 corporations, partnerships, proprietorships and professionals, including 3,700 state and local chambers of commerce, and professional and trade associations.

[1] This brief is filed with the written consent of the parties pursuant to Supreme Court Rule No. 36.2.

The Chamber regularly represents its members' interests in litigation matters before the courts, as well as generally before the United States Congress, the Executive Branch, and Federal regulatory agencies. Such representation constitutes a significant aspect of the Chamber's activities and includes participation as an *amicus curiae* in a wide spectrum of cases before this Court.[2]

The position taken by the Occupational Safety and Health Administration (OSHA) in this case — that it may issue extremely costly health and safety standards with little regard for whether those standards bear any relationship to the benefits to the affected workers and the public at large — is of extreme concern to the Chamber. Almost all of the Chamber's 98,000 members come within the Occupational Safety and Health Act's (the Act) broad definition of "employers",[3] and the impact on those members is substantial. For example, a recent study of OSHA's policy for regulation of carcinogens estimated that it alone will result in $9 to 88 billion in capital costs and $6 to 36 billion in annual costs, depending on how it is applied.[4]

---

[2] *See* e.g., *Whirlpool* v. *Marshall*, _____ U.S. _____, 63 L.Ed.2d 154 (1980); *Industrial Union Department, AFL-CIO* v. *American Petroleum Institute*, _____ U.S. _____, 65 L.Ed.2d 1010 (1980); *Chrysler Corp.* v. *Brown*, _____ U.S. _____, 60 L.Ed.2d 208 (1979); *First National Bank of Boston* v. *Bellotti*, 435 U.S. 765 (1978).

[3] Section 3(5) of the Act, 29 U.S.C. 652(5), defines "employer" as ". . . a person engaged in a business affecting commerce who has employees. . . " *See*, *Marshall* v. *Anchorage Plastering*, 570 F.2d 351 (9th Cir. 1978).

[4] Booz, Allen & Hamilton, Inc., Preliminary Estimates of Direct Compliance Costs and Other Economic Effects of OSHA's Generic Carcinogen Proposal on Substance Producing and Using Industries (February, 1978). This study was directed to OSHA's proposal for a generic regulation on controlling occupational carcinogens. 42 Fed. Reg. 54148 (October 4, 1977). That regulation was issued on January 22, 1980. 45 Fed. Reg. 5002.

Moreover, the Chamber's members are concerned that OSHA's approach will ultimately lead to less effective protection for their employees. For without any consideration of whether the benefits derived from a standard bear any relationship to the costs it imposes, it is impossible for OSHA to insure that employees receive the most benefit for each dollar spent by their employers on safety and health.

OSHA has proceeded on the apparent assumption that the finances available for compliance with a particular standard are limited only by the demise of a substantial portion of the industry subject to the standard. *See AFL-CIO* v. *Marshall*, _____ F.2d _____, 7 OSHC 1775 at 1790-91 (D.C. Cir. 1979). Yet such an approach is myopic in its examination of individual standards in a vacuum, rather than an examination of costs and benefits of a particular standard in the context of the overall benefits to employers in providing safe and healthful workplaces to their employees. OSHA's approach appears to violate the purpose of the statute "to assure as far as possible" safe and healthful working conditions.

The Chamber believes that more lives can be saved and serious injury prevented by OSHA standards which offer a larger return for the resources expended. Yet unless OSHA examines the effectiveness of its standards (as required by this Court in *I.U.D., AFL-CIO* v. *A.P.I., supra*) in the context of their economic consequences, there is no assurance that these regulations will approach the maximum lifesaving potential of the resources expended.

As the director of the Council on Wage and Price Stability wrote to Eula Bingham, Assistant Secretary of Labor for Occupational Safety and Health: "Since OSHA is faced with a finite quantity of society's resources or maximum costs that can be allocated to

worker safety and health in any industry, OSHA should pay serious attention to the development of standards which will deliver the maximum increment of worker safety and health from every dollar spent on compliance." Scheibla, "The Benzene Case, Its Outcome Will Have a Major Impact on Federal Regulation," Barron's, p. 10 (January 29, 1979).

It is because of OSHA's obstinate refusal to recognize that it has an obligation to consider whether there is a reasonable relationship between the costs imposed by its standards and the benefits resulting from them — a consideration that benefits employers, employees, and the public-at-large (through the reduction of inflationary pressures) — that the Chamber submits this brief.[5]

SUMMARY OF ARGUMENT

A requirement that the Occupational Safety and Health Administration demonstrate a reasonable relationship between the benefits conferred by a standard and the costs imposed by it is consistent with the requirements of the Act that standards be "reasonably necessary" and "feasible". Contrary to OSHA's protests, such an approach will further employee safety and health by assuring that limited resources will be spent where they will do the most good.

Comparisons of cost and benefit commonly enter into all aspects of our lives, and are constantly used by government in determining how to spend its limited resources. Moreover, government agencies such as the Consumer Product Safety Commission and the National Highway Traffic Safety Administration with statutory mandates similar to OSHA's use cost-benefit analyses to

make regulatory decisions not unlike that made by OSHA here. If these agencies can successfully use this technique, we have difficulty in understanding why OSHA cannot.

The economic feasibility test employed by OSHA and the District of Columbia Circuit ignores the benefits conferred by a standard. Simply put, that test finds a standard economically feasible if it does not drive a substantial portion of an industry out of business. By concentrating solely on the costs of a standard, the test does not result in safety and health dollars being spent where they will do the most good.

Finally with regard to cost-benefit, we note that OSHA has ignored cost-benefit in determining the manner in which employers can comply with its standards. In this regard OSH has consistently contended that the most expensive means of compliance must be used even though less expensive means may be as effective in reducing exposures. OSHA's position has been rejected by the Occupational Safety and Health Review Commission and three Courts of Appeals.

ARGUMENT

I. Assessing Benefits In Light Of The Costs Imposed On An Industry Is Consistent With The Act's Purposes.

A requirement that OSHA demonstrate a reasonable relationship between the costs imposed by a standard and its benefits is perfectly consistent with the Occupational Safety and Health Act. In the first place, the statute is a pragmatic one, as demonstrated by Congress's choice of phraseology. Thus, Section 2(b)[6] states

[6] 29 U.S.C. 651(b).

that it is the purpose of the Act "to assure so far *as possible* . . . healthful working conditions" (emphasis added). And Section 3(8)[7] defines an "occupational safety and health standard" as one requiring an employer to take steps that are "reasonably necessary or appropriate to provide safe and healthful working conditions." Section 6(b)(5)[8] requires that in regulating toxic substances, OSHA should "set the standard which most adequately assures, to the extent *feasible*, on the basis of the best available evidence that no employee will suffer material impairment of health. . . ." (emphasis added) We submit that a requirement that there be a reasonable relationship between costs and benefits of OSHA standards is consistent with these precepts. *See generally, A.P.I.* v. *OSHA*, 581 F.2d 493 (5th Cir. 1978), *aff'd. sub nom, on other grounds, I.U.D., AFL-CIO* v. *A.P.I., supra.*

As one commentator has noted:

> Each of the emphasized terms ["most adequately", "feasible", and "material"] requires a balancing of costs and benefits.
>
> The term "most adequately" is, of course, a solecism: something is either adequate or inadequate to serve its intended purpose. Also, had Congress wished to require OSHA to implement standards that ensure, to the extent feasible that no employee will suffer material impairment of health, Congress could have omitted the term "most adequately" and achieved that result; or to emphasize such an intent, Congress could have omitted the word "adequately" and retained the word "most," requiring OSHA to promulgate a standard that "most assures, to the extent feasible, . . . that no employee will suffer material impairment . . ." Given these ready, grammatically sound and more succinct ways of requiring

---

[7] 29 U.S.C. 652(8).

[8] 29 U.S.C. 655(b)(5).

> severe standards, Congress' use of the ungrammatical and tortured "most adequately" should be read as evidence of its intent to require OSHA to consider all societal costs of standards it proposes.

Wheeler, "Cost-Benefit Analysis on Trial: A Case of Delusion and Reality," National Law Journal, October 20, 1980, p. 29.

Many years before the Fifth Circuit's decision in the benzene case (*A.P.I.* v. *OSHA, supra*) suggested the possibility of a cost-benefit requirement inherent in the OSH Act, Professor Currie stated that Section 3(8) "does not simply require whatever is 'necessary' to achieve the requisite level of safety, it requires what is 'reasonably necessary or appropriate.' " "What is 'appropriate' may be what is desirable in light of feasibility or cost; what is 'reasonably necessary' may be what is both necessary and reasonable." Currie, "OSHA," American Bar Foundation Journal, 1976, pp. 1107, 1134.

OSHA has, however, steadfastly contended that "cost-benefit criteria" are inconsistent with the OSH Act. Brief for the Federal Parties, *I.U.D., A.F.L.-C.I.O.* v. *A.P.I.*, Nos. 78-911 and 78-1036, p. 40 *et. seq.* However, this misses the point. No one in this case has suggested that one must place a price tag on human life, and then decide whether an OSHA regulation is "worth it" in terms of that price tag. Instead, the point is that because the resources available for occupational safety and health are limited, they should be spent where they will have the maximum effectiveness in terms of lives saved. In order to approximate their lifesaving potential, OSHA must have some rough idea as to what the health benefit of each standard is compared to reasonable alternatives. Only in this manner can OSHA achieve its

statutory goal "to assure so far as possible every working man and woman in the nation safe and healthful working conditions." 29 U.S.C. §651. Standards unnecessarily requiring expenditures of millions of dollars will clearly not achieve anything close to the maximum lifesaving potential of the available resources.[9]

II. Considerations Of Cost And Benefit Enter Into All Aspects Of Our Lives

In this and other cases OSHA has implicitly argued that cost-benefit considerations are somehow immoral, and generally have no place in the safety and health arena. See *e.g.* Brief for the Federal Parties, *I.U.D., AFL-CIO* v. *A.P.I.*, *supra*, at pp. 62-63, n. 52. Yet, cost-benefit analyses are commonly performed in all aspects of our lives, even though both serious injury and perhaps death are possible consequences of the activity.

As one article has noted:

> The person who goes to work decides that the anticipated benefits of work outweigh the risk of injury that necessarily attends the trip to the place of employment; the person who plays golf decides that the anticipated pleasure of that exercise outweighs the risk of being hit by a ball or of pulling a muscle; the person who smokes, drinks, skis, swims or rides a motorcycle decides that those pleasures are worth the attendant risks. And such decisions are made where the safety of other persons is involved: the parents who leave their baby unattended in bed for one hour have decided that the pleasure of turning their attention elsewhere justifies the risk that their unattended infant will injure itself in the next room.

---

[9] *See*, Hapgood, "Risk-Benefit Analysis, Putting a Price on Life," The Atlantic, January 1979, pp. 33-38.

> The examples are infinite in number, because some danger inheres in every human action and omission; and some amount of safety is sacrificed by every action and omission. The variables are the probability of harm and the possible type of harm.

Wheeler, "The Public's Costly Mistrust of Cost-Benefit Safety Analysis," National Law Journal, October 13, 1980, p. 27.

Similarly, our government repeatedly uses cost-benefit considerations:

> . . . the decision to have a 55 mph speed limit, rather than a 25 mph speed limit, is unequivocally a decision to permit thousands of deaths; the decision not to allocate government funds to produce many more kidney dialysis machines is the same kind of decision; and the decision to promulgate air-quality regulations that permit any accumulation of smog is the same kind of decision.

Wheeler *supra,* at p. 29. And Federal administrative agencies with mandates not dissimilar from OSHA's use cost-benefit analyses as an effective tool to determine when to regulate and how to regulate.

For example, the CPSC operates under a statutory mandate to protect the consumer from "unreasonable risks of injury" associated with consumer products. 15 U.S.C. §2051(b)(1). Each standard must be "reasonably necessary" to prevent or reduce such risk. 15 U.S.C. §2056(a). This compares to the OSH Act, which is aimed at "material" impairment of health and requires that standards be "feasible" and "reasonably necessary." 29 U.S.C. §§652(8), 655(b)(5).

The CPSC's recent standard for walk-behind power lawn mowers illustrates its use of risk estimation in com-

plying with its statutory mandate. In this standard, the CPSC estimates that about 150,000 injuries associated with power lawn mowers occur each year, about 60,000 of which are treated in emergency room. 44 Fed. Reg. at 9992 (Feb. 15, 1979). The CPSC further breaks down the number of injuries expected to be prevented by each of the major requirements of the standard; estimates the dollar savings exclusive of pain and suffering; estimates the total retail price increase resulting from the standard ($189 million); and concludes that the standard is reasonably necessary to reduce an unreasonable risk of injury. 44 Fed. Reg. at 9996-7 (Feb. 15, 1979).

Another example of effective agency use of cost-benefit analysis is that of the National Highway Traffic Safety Administration (NHTSA).

In its "Five Year Plan for Motor Vehicle Safety and Fuel Economy Rulemaking", NHTSA has stated that among the factors it considers in establishing motor vehicle safety standards are "anticipated costs to consumers and industry" and "lifesaving potential of a safety standard." 43 Fed. Reg. 11100, 11101 (March 16, 1978). An excellent example of NHTSA's practice in this regard is found in its air bag standard, which sets forth the "Fatalities Prevented Per Year" and the "Injuries Prevented Per Year" under each of the various occupant restraint systems under consideration, with costs estimates for the full front air bag system (one of the options chosen in the final regulation). 42 Fed. Reg. 34289, 34298-99 (July 5, 1977).[10]

---

[10] A more detailed breakdown of NHTSA's cost-benefit analysis of the air bag standard is set forth at 41 Fed. Reg. 31860 (July 30, 1976). Using the highest NHTSA cost estimate, the full front air cushion system, adopted in the final regulation, is estimated to save lives at a cost under $300,000 per life (leaving out of the estimate any allocation of cost to the substantial number of injuries prevented by the regulation).

NHTSA's statutory mandate is similar to OSHA's. Like OSHA, NHTSA's overriding mission is to protect health and safety: to "reduce traffic accidents and deaths and injuries to persons resulting from traffic accidents." 15 U.S.C. §1381. However, the standards must be "reasonable, practicable and appropriate." 15 U.S.C. §§1392(f), 1391(2). Mr. Justice Stevens' description of NHTSA's authority fits almost exactly to OSHA:

> Although I recognize that safety is the 'overriding consideration in the issuance of standards' under this Act, the statute requires respondent to consider whether a proposed standard is 'reasonable, practicable and appropriate' before it is prescribed.

H & H Tire Company v. *Department of Transportation*, 471 F.2d 350, 357 (7th Cir. 1972) (Stevens, J., concurring). But unlike OSHA, NHTSA interprets this mandate to estimate the safety and health benefits of its regulations.

Thus, cost-benefit analyses are not the radical approach to regulation that OSHA would have one believe. Rather, it is a rational, commonly applied method of determining whether regulation is "reasonably necessary" and "feasible."

III. The District Of Columbia Circuit's Holding That OSHA Standards Are Economically Feasible So Long As The Affected Industry Is Not Put Out Of Business Is Erroneous.

OSHA argued, and the District of Columbia Circuit held, that a standard was economically feasible so long as it did not make " 'financial viability generally impossible' for a regulated industry." *AFL-CIO* v. *Marshall*, 617 F.2d 636, 661.[11] The court also noted that

[11] *Quoting*, *Industrial Union Department* v. *Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974).

"[e]ven if a few firms are forced to shut down, the standard is not necessarily economically infeasible." *Id.*

The Chamber submits that such a test is far removed from the best interests of employees and is not required by the Act. Moreover, we believe that a cost-benefit test better serves the interests of safety and health.

Our basic objection to OSHA's (and the D.C. Circuit's) test is that it totally ignores the benefits conferred by the standard. Thus, a standard that produces relatively few benefits but is extraordinarily expensive could drive the affected industry to the brink of financial viability. Under the test adopted by the D.C. Circuit, this standard would be economically feasible.

Yet, if OSHA should subsequently issue another standard affecting the same industry, which may in fact produce greater benefits for more workers, that standard would be found economically infeasible because the additional costs would put the industry over the financial brink.

Such an approach benefits neither the employer nor the employee; and, we are hard pressed to understand how it furthers the purposes of the Act. Rather, an approach which preserves economic resources for the situation where they will do the most good is eminently more reasonable than that of OSHA.

IV. OSHA Has Unreasonably Refused To Consider Whether There Is A Reasonable Relationship Between The Costs Imposed By A Standard And The Benefits Conferred In Determining *How* To Regulate Toxic Substances.

Despite the statutory mandates previously discussed, that OSHA standards be "reasonably necessary", "feasible", and address "material" workplace hazards, OSHA has consistently chosen the most expensive means of eliminating exposure to toxic substances or harmful physical agents. Thus, OSHA has rejected substantially less expensive means of compliance in order to achieve increases in safety that are marginal, at best.[12]

Even where there is agreement that some regulation of a health problem is justified, OSHA has rejected any reliance on a cost-benefit test in determining how to regulate.

The Occupational Safety and Health Review Commission, the independent agency establishment by the Act to review OSHA enforcement actions (29 U.S.C. §661,) has disagreed. In *Continental Can Company*,[13] OSHA had cited Continental for violation of OSHA's noise standard in that Continental had not installed engineering controls in its plants to reduce noise levels. The parties had stipulated that Continental had provided its employees who worked in areas of excessive noise with personal protective equipment (ear muffs and ear plugs) which effectively reduced their exposures to noise below the levels provided by the standard. 4 OSHC at

---

[12] Petitioners, here, pointed out in their petition that OSHA rejected "an equally effective, but considerably less expensive, alternative to the standard effective, but considerably less expensive, alternative to the standard OSHA promulgated." Petition for *cert.* p. 9.

[13] 4 BNA OSHC 1541, 1976-77 CCH OSHD ¶ 21, 009 (1976).

1542. Despite the fact that the personal protective equipment effectively protected the employees from the hazard at an annual cost of approximately $100,000, OSHA contended that Continental should spend $32 million to install engineering controls to achieve the same result. 4 OSHC at 1544. OSHA argued, as it has here, that the extreme cost difference between the two means of compliance could not be considered unless the cost of the controls "seriously jeopardized the financial condition of the company." 4 OSHC at 1542, n. 4. The Commission (Cleary dissenting) held that the comparative cost of alternative means of compliance was a valid consideration, and that, under the circumstances, OSHA had failed to establish that the $32 million engineering controls were "feasible."[14] The Commission noted that OSHA's approach was unreasonable "because it does not distinguish between hazards" 4 OSHC at 1547. It went on to say:

> The argument also ignores the benefits to be gained since it requires employers to expend funds for each and every health hazard whether life threatening or not without limit so long as the expenditures for each hazard can be borne without putting the employers' financial condition in jeopardy. Clearly, employers have finite resources available for use to abate health hazards. And just as clearly if they are to be made to spend without limit for abatement of this hazard their financial ability to abate other hazards including life threatening hazards, is reduced. We can conceive that in some if not many cases it will be reduced to the point that they will be put in financial jeopardy when faced with the problem of abating a life threatening hazard. Such a result does not comport with the purposes of the Act

---

[14] *See also, Samson Paper Bag Company, Inc.*, 8 OSHC 1515 (1980), wherein Commissioner Clearly indicates that economics may be a valid consideration.

> because in our view resources should be allocated on a priority basis to obtain the benefits that may be achieved by eliminating life threatening hazards first and lesser hazards second. And by saying "second" we do not mean second in time but rather second in priority for allocation of resources. In this regard Congress recognized the need for establishing priorities in eliminating workplace hazards. Thus it mandated Labor to set priorities on an urgency of the need basis. 29 U.S.C. 655(g).

4 OSHC at 1547.

Two Courts of Appeals have followed the Commission's lead in this regard. In *Turner Co.* v. *Secretary*, 561 F.2d 82 (7th Cir. 1977), the Seventh Circuit expressly adopted the test set out by the Commission in *Continental Can*, *supra*, stating:

> In this perspective the Commission must realistically consider the hazards presented by the excessive noise . . . and determine whether the health benefits to employees who are already equipped with personal protective equipment justify the . . . cost to Turner.

Turner Co. v. *Secretary*, *supra*, at 86.

Similarly, in *RMI Company* v. *Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979), the Sixth Circuit agreed with both the Commission's decision in *Continental Can*, *supra*, and the Seventh Circuit's decision in *Turner Co.*, *supra*. The court stated that economic feasibility "should be considered in promulgating and enforcing regulations" (594 F.2d at 572), and that [w]e insist that the Secretary and the OSHRC on review, weigh the costs of compliance against the benefits expected to be achieved thereby in order to determine whether the proposed remedy is economically feasible." 594 F.2d at 573.

While these three cases are enforcement cases, the principle espoused — that OSHA in considering alternative methods of compliance, must weigh the costs against the benefits — is equally applicable to the promulgation of new standards.[15]

In *I.U.D., AFL-CIO* v. *A.P.I., supra,* this Court in a plurality opinion held that OSHA must establish by substantial evidence that its standards eliminate a significant risk. While this holding forces OSHA to assess the benefits of its standards, it does not compel them to consider alternative, possibly less expensive, means of compliance that might be just as effective in eliminating significant risks. It is for this reason that it is important that this Court now require OSHA to demonstrate a reasonable relationship between the costs of its standards and the benefits to be derived from them.

---

[15] The U.S. Court of Appeals for the Fifth Circuit has, of course, held that cost-benefit must be considered in the promulgation of a standard. *A.P.I.* v. *OSHA*, *supra*. That decision was affirmed by this Court on alternative grounds. *I.U.D., AFL-CIO* v. *A.P.I.*, *supra*.

CONCLUSION

For the foregoing reasons, we respectfully urge that the decision of the United States Court of Appeals for the District of Columbia Circuit be reversed.

STEPHEN A. BOKAT
Counsel of Record
STANLEY T. KALECZYC
NATIONAL CHAMBER
LITIGATION CENTER, INC.
1615 H Street, N.W.
Washington, D.C. 20062
(202) 659-3186

No. 79-1429

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC.,
Petitioner,

v.

RAY MARSHALL, SECRETARY OF LABOR,
Respondent.

On Writ of Certiorari from United States Court of Appeals for the District of Columbia Circuit

---

BRIEF AMICUS CURIAE OF THE CHOCOLATE MANUFACTURERS ASSOCIATION

J. GORDON ARBUCKLE
DAVID B. ROBINSON
PATTON, BOGGS & BLOW
2550 M Street, N.W.
Washington, D.C. 20037
(202) 457-6000

Attorneys for Chocolate Manufacturers Association

November 20, 1980

PRESS OF BYRON S. ADAMS PRINTING, INC., WASHINGTON, D. C.

TABLE OF CONTENTS

Page

I. Interest of the Amicus Curiae 1

II. Argument 2

III. Conclusion 6

TABLE OF AUTHORITIES

Cases:

RMI Co. v. *Secretary of Labor, et al.*, 544 F.2d 566 (1979) 4

Turner Company v. *Secretary of Labor, et al.*, 561 F.2d 821 (1977) 3, 4

Executive Order:

Executive Order No. 12044, 43 Fed. Reg. 12661 (March 24, 1978) 5

Other:

Fletcher, Fairness and Utility in Tort Theory, 85 Harv. L. Rev. 537 (1972) 5

No. 79-1429

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC.,
Petitioner,

v.

RAY MARSHALL, SECRETARY OF LABOR,
Respondent.

On Writ of Certiorari from United States Court of Appeals for the District of Columbia Circuit

BRIEF AMICUS CURIAE OF THE CHOCOLATE MANUFACTURERS ASSOCIATION

I. INTEREST OF THE AMICUS CURIAE

In the opinion below the Court of Appeals for the District of Columbia Circuit held incorrectly that the Occupational Safety and Health Administration, when it promulgates an occupational safety and health standard under the Occupational Safety and Health Act of 1970, 29 U.S.C. §§ 651 *et seq.*, has no duty to make any "determination that the costs of the standard bear a 'reasonable' relationship to its benefits." 617 F.2d 636, 664.

The Chocolate Manufacturers Association (CMA) is filing this *amicus* brief in support of petitioners solely to underscore the importance of the basic principle that OSHA standards must be "reasonable" in the sense that (1) the benefits to be derived and the costs of compliance must be considered, and (2) the least costly method of achieving the regulatory objective must be favored.

CMA is a trade association whose member companies are engaged in the business of manufacturing chocolate products. CMA members are not familiar with the cotton dust standard which is under review in this case, and they have had no experience under it. Their concern that OSHA rules be "reasonable" stems directly from their attempts to comply with other OSHA regulations: those which limit exposure of workers to noise.[1] CMA believes that the experience of industry under OSHA's noise regulations may be relevant to any general interpretation of the Occupational Safety and Health Act.

II. ARGUMENT

OSHA's noise regulations require manufacturers to use all "feasible" methods to reduce physical noise levels in their plants to allowable limits. Only if there is no "feasible" way to reduce worker exposure to noise to those limits is an employer permitted to rely

---

[1] OSHA's noise standard provides in relevant part that:

> When employees are subjected to sound exceeding those listed in Table G-16, *feasible administrative or engineering controls shall be utilized.* If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table. 29 C.F.R. § 1910.95(b)(1). (emphasis supplied)

upon the use of earplugs and personal protective equipment to protect workers' hearing. The cost of redesigning and rebuilding factories and equipment is obviously enormous when compared to the alternative cost of issuing individual hearing protectors. Food processors face particularly difficult problems in complying with noise requirements because good sanitation practices (and the requirements of the Food and Drug Administration) require the use of hard, easily cleanable surfaces rather than soft, sound absorbing material in their plants.

In enforcement actions arising under the noise standard, OSHA has consistently taken the position that it has no obligation to weigh economic costs. OSHA's position on noise control, like the position it advances in this case, is that it is required only to show that an engineering solution is technically possible and that it will not jeopardize the solvency of the employer.[2]

In the context of noise control, the courts have emphatically rejected OSHA's cost-blind approach to regulation. In *Turner Company* v. *Secretary of Labor, et al.*, 561 F.2d 82, 83 (1977), the Seventh Circuit looked to the "clear intent of Congress and the purpose of the Occupational Safety and Health Act" and concluded that the term "feasible" as used in the

---

[2] *See*, for example, Turner Company v. Secretary of Labor, et al., 561 F.2d 82, 83 (7th Cir. 1977), in which OSHA argued that it was proper for it to limit its "consideration [of costs] to the financial ability of an employer to pay for technological controls irrespective of compelling alternatives."

In a pending action before the Ninth Circuit, OSHA is arguing that "engineering [noise] controls are economically feasible [whenever] they do not threaten financial viability of an employer." Brief for the Secretary of Labor in Marshall, *et al.* v. Castle & Cooke Foods, *et al.* (No. 77-2565) at 24 (filed February 3, 1978).

noise regulation "must be given its ordinary and common sense meaning of 'practicable.'" The *Turner* Court applied a standard originally established by the Occupational Safety and Health Review Commission and admonished OSHA that it must "realistically consider the hazards presented by the excessive noise . . . and determine whether the health benefits to employees who are already equipped with personal protection equipment justified the . . . costs . . . for engineering controls." 561 F.2d at 86. Similarly, the Sixth Circuit approved the *Turner* test and, following "numerous cases" from other circuits, "insist[ed] that the Secretary . . . weigh the costs of compliance against the benefits expected to be achieved therefrom in order to determine whether the proposed remedy is economically feasible." *RMI Co.* v. *Secretary of Labor, et al.*, 594 F.2d 566, 571-72, 573 (1979).

Of central importance to both circuits was the failure of OSHA to weigh the availability of less costly methods to achieve the health goals of the standard.

The requirement that OSHA must determine whether the benefits expected from a standard bear a reasonable relationship to the costs imposed by the standard is nothing more than a recognition that capital resources are finite and that finite resources must be allocated in a rational way. If, for example, workers' hearing can be protected by means of inexpensive hearing protectors and regular audiometric testing, it is neither rational nor reasonable to require massive capital investments in plant and equipment. Further, OSHA regulation does not exist in a vacuum. Manufacturers are simultaneously subject to regulation by many agencies with many different goals. It is obviously not possible to allocate finite resources in a

rational fashion if the test applied by each regulatory agency is whether the capital expenditures required by the regulations of that agency alone will endanger the financial health of the industry. Rational allocation of resources is possible only if each agency is required to identify and evaluate the benefits of its proposed regulations together with their costs. It was partially in recognition of the fact that resources are finite that Congress expressly required OSHA to measure its standards by the test of "reasonableness." [3]

For the same reason, the President of the United States has adopted as the policy of the executive branch of the government that regulations "shall not impose unnecessary burdens on the economy" and that all executive agencies shall consider "alternative approaches" to ensure that "the least burdensome of the acceptable alternatives has been chosen." Executive Order No. 12044 (Improving Government Regulations), 43 Fed. Reg. 12661, 12662 (1978).

The Chocolate Manufacturers Association is not familiar with the record before the agency in this case and therefore takes no position on whether OSHA properly considered costs and benefits in this particular instance. CMA's concern is that the Court's opinion in this case not diminish the obligation of OSHA in regulating other hazards, including noise, to be sensitive to the economic costs of its regulations and to determine, after consideration of less costly alterna-

---

[3] The statute, 29 U.S.C. § 652(a), requires that OSHA regulations be "reasonably necessary or appropriate." In the context of tort law, one commentator has said:

> "Reasonableness is determined by a straight-forward balancing of cost and benefit." Fletcher, Fairness and Utility in Tort Theory, 85 Harv. L. Rev. 537, 542 (1972).

tives, whether the costs of a proposed regulation are reasonable in light of the benefits to be derived from it.

III. CONCLUSION

The CMA respectfully urges this Court, whether it affirms or reverses the decision below, to recognize the basic principle that OSHA must identify and consider both the costs of compliance and the benefits of the regulations which it proposes.

Respectfully submitted,

J. Gordon Arbuckle
David B. Robinson
Patton, Boggs & Blow
2550 M Street, N.W.
Washington, D.C. 20037
(202) 457-6000

Attorneys for Chocolate Manufacturers Association

November 20, 1980

see 7 9

1 5 8 3

see 789

SUPPLEMENT FOLLOWS ON NEXT FICHE